Dearest Memories: Supporting Early Parenthood with New Media

Master's Thesis

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Aalto University **School of Arts, Design and Architecture**	Aalto University, P.O. BOX 11000, 00076 AALTO www.aalto.fi **Master of Arts thesis abstract**

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Abstract

Having a baby is one of the most significant lifetime events for both mothers and fathers. Parents looking for baby-related information can be overwhelmed by the considerable amount of data that is available to sift through. Early parenthood is one of the emotionally richest moments of one's life, which will be told numerous times in family narratives. There have been numerous attempts at improving the situation concerning the wealth of information and capturing the emotional moments through various media, including new media. However, modern-day solutions have not fully utilized the potential of information and communication technology (ICT). There is an obvious need to explore this topic in order to supply early parent- and babyhood with digital tools.

This thesis aims at developing the best possible service for parents using new media, and describes the project starting from the motivation all the way to the initial design mockups and their evaluation. Interaction, experience and service design, and memory related studies serve as the most relevant theoretical frameworks for the work. I conducted benchmarking and seven interviews, and wrote four scenarios to compile the design requirements. Based on the requirements, I designed five main screens for a mobile application, which were evaluated by four experts. One of the most interesting discoveries is the link between information and memories. Another one is the demand for comparison between siblings. The thesis concludes with future development ideas and my reflections on the design.

Keywords interaction design, experience design, service design, memory, parenthood, babyhood, mobile

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It has taken quite a while to complete this MA thesis, and even more so for the degree. At some point, I almost gave it up. Although I am an experienced designer since many years, I did not manage to design my own experience with this project. Now it is about time to end a long-pending study and move forward to new experiences in my life.

I would like to thank the Aalto University Media Lab for giving me an opportunity to study and for being patient with my slow pace. Needless to say, I really appreciate Markku Reunanen's dedication as a supervisor and a life companion. It was a privilege to have such an excellent supervisor available almost all the time. Without him, I would not have been able to pull it through in the middle of all the challenges.

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want to encourage him to not give up things easily, with this thesis project hopefully serving as an example.

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Contents

Chapter 1

Introduction

What we know about human history is derived from the desire to record. Prehistoric cave paintings and, likewise, numerous history books have resulted from it. Recording is not only for self-memory but also for sharing one's stories. The capacity of the human memory has its limits, but by recording, one can be released from the pressure of memorizing everything, trigger long-term memory and enrich the whole process (Norman, 2002*a*, 54–80). Through various media the memories may reach many others (see van Dijck, 2007, 51–76).

New media, in particular, makes it easy to access and publish personal content. The modern nomadic lifestyle has made people move around the world, and the need for personal media has arisen from the desire to share moments with relatives and friends across the borders (e.g. Jomhari, Gonzalez and Kurniawan, 2009). Social media and blogging, as means of communication, are not bound by time unlike phone calls: anyone can check the newest updates anytime he or she wants.

While many things in our lives have changed thanks to digital technology, there are still events that are of a more permanent and universal nature. Having a baby, whether it is planned or a surprise, is one of the most overwhelming events in one's life. During the first year, the growth of a baby is almost too tremendous to keep up with all the enjoyable moments and milestones.

This study identifies the potential interactions and experiences during the first year of a baby and pursues the best possible way to support parent- and babyhood expe-

riences (see Hassenzahl et al., 2013; Desmet and Hassenzahl, 2012). With a service design approach, I seek a way to help to consume the needed information efficiently. The information already exists in the world, and information and communication technology (ICT) has made it available to the general public. The point, however, is not the information itself, but rather the access to verified knowledge when it's most needed. To distill the above discussion into one research question:

How to support parents with new media tools during the first year of a baby?

Surely, there are tools that offer information in a somewhat effective way, and that encourage the recording of memorable moments with a baby. They are good for their own ends, but are typically only focused on either offering or tracking information. However, much more could be done if there was a tool that could combine both, and help to capture the memorable moments—hence, *Dearest Memories*.

1.1 Personal Motivation

Before having a baby, I occasionally saw some baby-related information on the Web and baby magazines. It used to be something totally outside of my interests, until I had a baby myself. After that, the experiences with my son have opened my eyes to a completely new domain. As I was not originally even aware of what I needed, I started thinking of what would have been good to know or have. Based on my thoughts, I wanted to design a tool that would be helpful for both the parents and the baby.

I felt some frustration starting right from the pregnancy: it seems that the Finnish *Neuvola* system offers pretty good information related to pregnancy and infant development, but most services are in either Finnish or Swedish (for further discussion on Neuvola, see Chapter 4). Some information is available in English, but Neuvola often does not have brochures that they could hand to those who do not speak Finnish.

Looking back at my own experiences, I was frequently flustered because almost everything that happened was for the first time in my life, and there was an overload of scattered information. I have often felt sorry that I have let the joyful moments or milestones pass away. I do still remember how the birth was and the main developmental milestones, yet it seems that the memories are fading with time. For example,

I am not sure any more about his height and weight when he was born. For those I need to check his Lapsuusiän Terveyskortti (Neuvola statistics booklet).

My parents and siblings live in South Korea and I myself am in Finland. In addition, my son's father-side relatives live at a distance. We have been sharing some pictures and movie clips on the Internet, using various channels, such as the *Facebook*, *YouTube*, our own website, FTP, and e-mail. Nevertheless, I have not been able to share all the moments as much as I would have wanted. Sharing is another tedious extra duty after recording, and both need to be organized well so that the records become a lasting form of memorabilia.

It would have been great to have had a tool that helps recording and sharing the valuable moments of the baby, and that would also offer appropriate information according to the age of the baby. Information along with a timeline would relieve new parents' pressures concerning what to expect, and also give hints on what to write down for the future. The needed information is available here and there, like the brochures from the health station, websites, or books. However, limited time and energy do not facilitate looking for it. Therefore, the tool should facilitate doing things quickly, just as in all other everyday activities (cf. Norman, 2002*a*, 187–217).

1.2 Thesis Scope and Structure

The initial target group is those parents who have babies ranging from newborn to twelve months, since especially during that period babies grow immensely. If the service works well for the group, it can possibly be extended to older age groups as well as the pregnancy. Location-wise, first, I did not intend to limit the scope at all, but the experience with a baby can vary enormously depending on the geographical region because of the law, regulations, and culture. I also narrowed down the location to Finland.

As part of the study, I interviewed not only Finnish but also foreign parents, who might have faced some challenges in a different culture or who needed to share their baby's moments abroad with their relatives and other close ones. As the foreign-language population in Finland, especially in Helsinki, has been increasing, and the rise is expected to continue (City of Helsinki, 2012), the project definitely needs to take into account their voices.

Based on the interviews, I realized that the thirst for information was much more evident with parents with their first baby. The amount of memory products also differed significantly between the first child and the later ones (see Chapter 4). Therefore, I focused the project especially on the needs of first-time parents, although the service also supports parents with more than one child.

For the theoretical study (Chapter 2), I went through interaction, experience, and service design and their co-relations because the thesis deals with a service that steers baby- and parenthood experiences toward a more positive direction. As one of the main purposes for the service is storing memories, I also checked various memory-related studies with a special focus on the importance of memory, particularly the autobiographical memory, and how we save memories.

As background research, I conducted benchmarking (Chapter 3) and interviews (Chapter 4). I checked the existing tools, mostly mobile apps, which are mainly tracking tools and a few information offering tools that could be best described as extras to the main web-based content services. Through the interviews, I validated my initial idea and developed it further from diverse angles.

I wrote four scenarios (Chapter 5) that depict expected uses cases based on the background research. They were used as a means of concept development. Through the analysis of the scenarios, I compiled a list of requirements for the design. As the concept turned out to be too massive to complete within the given time frame, I decided to design only the most critical features for this thesis as the first step of the iterative design process, and still managed to run a heuristic evaluation for assessing the usability (Chapter 6). Chapter 7, the conclusion, contains further development ideas and reflections on the design.

Chapter 2

Context of the Work

The two main contexts of this work are multidisciplinary design and memories. First, I will discuss how the evolution of emerging design fields has been affected by technologies, economies and how they relate to each other. The next section contains discussion on memory in order to provide a basic theoritical understanding of how memories are created, stored and retrieved. The discussion continues on the changes that have been brought about by digital technology.

2.1 Emerging and Evolving Design Fields: Interaction, Experience and Service

In the field of design, for a few decades, the multidisciplinary approach has been a visible topic, and new related design disciplines have emerged: Interaction design, service design, experience design, and transformation design. Due to their multidisciplinary roots, many of them share some common ground among each other. Some of them have even evolved from one to another and expanded themselves with their own unique aspects. For instance, human-computer interaction (HCI) drew from computer science, cognitive science, human factors engineering, psychology, sociology, and design, yet it stressed computer technology (Carroll, 2013). However, it has fostered the user-centered design approach and several design disciplines such as interaction design, experience design and service design.

2.1.1 The Effect of Technology on Design Disciplines: toward Interaction Design and beyond

David Liddle, who led the team that designed the *Star* graphical user interface at Xerox PARC, described three technology development phases: the enthusiast phase, the professional phase and the consumer phase. The first phase is about the technology itself. The second phase is for professional use, which means purchasers are often not the same as the end users. Price, reliability, and professional producutivity matters rather than the usability and experience. HCI started from this phase in terms of usable and useful technologies. (Moggridge, 2006, 242–251) The third phase, where we are in the use of ICT, values people's needs, into which the technologies have to fit (Crampton Smith, 2006). At this stage, interaction design was derived from HCI, by shifting focus from technologies, that are the foundation of product or system development, toward users.

When the discipline of interaction design emerged, the gap between our physical world and technologies' virtual world was considerable because of the traces of previous technology-oriented developments. HCI had made an effort to narrow the distance from a functional perspective—usability—whereas, in addition to that, interaction design has taken into account an emotional perspective. According to Cooper, Reimann and Cronin (2007), interaction design is designing the behavior of digital artifacts, which are not necessarily tangible, to support and facilitate human behavior. In other words, it is not merely a matter of aesthetic choice; rather, it is about enriching enjoyable communication between technologies and people. This requires contextual knowledge of how the user wishes to use the product, in what ways, and to what ends. (Cooper, Reimann and Cronin, 2007, 11–13) Another definition of interaction design by Crampton Smith (2006) is, "shaping our everyday life through digital artifacts—for work, for play and for entertainment." Judging by these two definitions, the scope of interaction design has indeed stretched more and more toward people and their lives.

The expansion of interaction design has led to the advent of user experience design and later, to experience design and service design. User experiences are often created through interaction among users, others and interactive systems. User experience design is often misunderstood as another name for interaction design. However, the term 'user experience' is associated with a wide variety of meanings (Forlizzi and Battarbee, 2004), ranging from traditional usability to beauty, hedonic, affective or

experiential aspects of technology use (Hassenzahl and Tractinsky, 2006). Although user experience design, as a sub-category of experience design, covers a significant part of it, user experience design alone does not cover the whole evolution of the experience design field (cf. Hassenzahl, 2013). Therefore, it is better to discuss experience design here.

The expansion and emergence of design disciplines was predominantly influenced by the development of ICT (Kimbell, 2009). It has made technologies pervaded and intertwined with everyday life, by adapting to social demands and converging themselves. Although technologies generally intend to improve everyday life through satisfying the requirements of people and the society, ICT has also introduced extra complexity (see Norman, 2011, 260–263). This complexity has dragged attention to design from the management field (Kimbell, 2009). ICT has enhanced and enriched personal media culture, which has provided a channel for people's voices and spread them efficiently through the Internet. People are not afraid of sharing their opinions of everyday life, and some enjoy their impact on society. This has boosted participatory culture, which plays an important role in the co-design and co-creation approach.

2.1.2 Experience Design, Service Design and Economies

As mentioned above, the emergence of both experience design and service design has been affected by the integration of ICT with everyday life and the increased interest toward design from business fields (Kimbell, 2009). However, the link between experience design and the economy is much more loose than the one between service design and the service sector.

Experience design and experience economy face the same challenge of creating meaningful or memorable experiences (Pine and Gilmore, 1998; Hassenzahl, 2013). Nonetheless, they have not affected each other much, since the concept of experience economy, as an emerging sector, has been unclear, due to diverse experience areas with different market value creation and growth (Bille, 2010). Pine and Gillmore (1998) define the experience economy as the new emerging fourth sector, which is generally lumped together with services. By contrast, Danish researchers define it as an area that goes across branches or sectors because experiences have become part of physical products and services (Iversen et al., 2006, 22). In any case, the trend from the Nordic countries, which finds the future of ICT in the experience economy

(ibid., 22–77), seems to promise intimate relationships between experience design and experience economy.

On the other hand, service design emerged from a large, growing, evolving and established sector, *services* and the related service science (Kimbell, 2009). Services are widely recognized as the major sector of most developed countries. For instance, based on the *Economic Report of the President, 2009*, Jensen (2011, 14–15) points out that services account for the vast majority, about 85 percent, of non-agricultural employment in the United States, having risen from about 65 percent (already a substantial majority) 50 years ago. Another example is the Hong Kong economy where the sector constituted a share of 88.4 percent of total employment in 2012 (Information Services Department, 2013). Initially, the challenges related to services were tackled in pieces by various stakeholders, mainly marketing and operations in the management field. Service design has naturally inherited the ambiguity and diversity of the service sector and relatively little academic study.

2.1.3 Experience Design and Service Design

There are some similarities between experience design and service design. Both services and experiences are intangible, which created "fuzziness" to the terms (Battarbee, 2004, 16–30; Kimbell, 2009; Stickdorn, 2010*b*; Jensen, 2011, 11–40; Hassenzahl, 2013). Not only do the terms cover various areas, but also the economies and design disciplines are evolving all the time. Consequently, these facts open up discussion on the definition of each design discipline (ibid.). Moreover, service design ultimately stands on service experience, which overlaps within the realm of experience design. Neither of them can be completely designed due to their nature, so designers (as facilitators) focus on situations or intentions to shape both the experience and service (Sanders and Dandavate, 1999; Kimbell, 2011). Thus, the expression "design for experience or service" is preferred rather than "service design or experience design" by several scholars of the field (Suri, 2003*b*; Battarbee, 2004, 23–24; Meroni and Sangiorgi, 2011, 9–33).

Most significantly, both disciplines embrace interaction with users or customers. The user-centered design (UCD) approach, also known as human-centered design (related to interaction design) has been adapted to both fields. As UCD is expanding itself by encompassing all user-related processes and methods (e.g. participatory design,

empathic design, contextual design and iterative design), it covers the core of experience and service design. Naturally, both service and experience design are multidisciplinary; particularly, ethnographic study plays a crucial role in understanding users and the context. Both design approaches are holistic: designers have to understand the relationships among systems, products or even service providers in service design, plus users or customers and experiences that result from their interactions in a context. Deep consideration of user engagement has been required both design disciplines. (cf. Mager, 2009; Stickdorn, 2010*a*)

Since experience is subjective, holistic, situated, dynamic and positive (Hassenzahl, 2010, 9–31), experience design has been leaning toward emotions. Accordingly, recent studies on the discipline have concerned the positive emotional motivation for experiences, happiness and well-being (Desmet and Hassenzahl, 2012; Hassenzahl et al., 2013). This demands designers to get much closer to users beyond the traditional research methods—objective observation and questioning. During the design process, designers have to communicate with users interactively to co-construct and refine a story, which later leads to meaningful experiences. Sharing the subjective, empathic design approach has been used in the early stages of designing for experience, concept search and concept design (Koskinen and Battarbee, 2003). Empathy is necessary to understand the experiences of others and inspires designers with ideas for positive future directions (Suri, 2003*a*; Battarbee, 2004, 66–68). Experience designers should consider not only personal experiences, but also co-experiences if the design involves social interaction (Battarbee, 2003). Since people live and communicate with others everyday, their experiences can be formed with people around them, or shared later as mediated past experiences with others, and create other meaningful experiences, co-experiences.

These approaches are also utilized in service design to deal with experiences within services (Meroni and Sangiorgi, 2011, 37–41). Service design invites customers as well as other various stakeholders to the design process, co-design, to explore potential directions and gather a wide range of perspectives (cf. Stickdorn, 2010*a*). Furthermore, they also participate in the service deployment and use. These two ways of involvement with a service are one of the principles of the service design approach, co-creation (Mager, 2009; Steen, Manschot and Koning, 2011). Meroni and Sangiorgi (2011) try to explain design contributions based on four unique features of services:

- *Intangibility* differentiates services from goods. Service designers try to make the intangible tangible and visible by evidencing the service offering and service experience, for example, through a customer journey and scenarios.
- The *inseparability* of production and consumption is tackled by co-design approaches. Due to seeing users as a source of insights and ideas, customers or users cannot be excluded from the production of services.
- *Heterogeneity* means that the quality of services cannot be standardized, due to the influence of the situation and service participants. Design focuses on a better framework of services for flexibility and the possibilities of customization and modularities of services.
- *Perishability* means that services cannot be inventoried. Designers contribute to define replication strategies or work toward radically new collaborative service models when coping with service perishability. (Meroni and Sangiorgi, 2011, 15–26)

2.2 Memories

As we live, we experience mundane everyday life as well as various notable events. We either remember or forget what we have experienced; we do not hold every single moment because some happen quite regularly or are not meaningful enough to cherish. Some moments that we want to preserve may stay with us. According to van Dijck (2007, 25–52), the details are blurred by time, or their meanings reassessed and recreated every now and then by our changing perspectives. Our brain capacity and the way we perceive life requires constant updates of our views and memory (ibid.).

2.2.1 Memory Matters

Although our memories are limited and distorted, they play a significant role in continuing our lives, identifying ourselves, and being members of society. We see the present and how to go forward in the future based upon our past experiences. Our memories have established us as unique individuals and provids sources for socializing. Sharing experiences generally enriches one's conversations by making them interesting and reliable. At the same time, one can reflect memories with others' diverse perspectives. Moreover, one's abundant experiences enable one to empathize

with others and to enhance social bonds. This particular type of memory is called autobiographical memory (AM) in psychology, and has three main functions: directive, self and social. (Bluck et al., 2005)

Even babies remember their past, yet their lack of verbal and narrative skills and sense of self makes their past memories fragmented, like a snapshot of an event (Eacott, 1999). By the time toddlers begin to use language, some of these bits and pieces of their past memories become shared narratives with their parents. Through telling, listening, adding, confirming and repeating past stories with family, young children learn the form and function of narratives. These narrative skills and social interactions with family are fundamental to shape AM. AM emerges around preschool years and keeps developing throughout childhood and adolescence. Family reminiscing, particularly, the maternal reminiscing style, heavily influences multiple aspects of children's cognition, sociemotional development and even their well-being. (Fivush and Nelson, 2004; Fivush, Haden and Reese, 2006; Fivush, 2008)

AM is about the self, yet social and cultural interactions are critical factors in it. The formation of AM in childhood and adolescence heavily relies on relationships with others, especially the family. Moreover, the social function of AM enables one to learn about another person's life to build a new relationship, as well as nurture relationships through maintaining social bonding. (ibid.) Indeed, memory intertwines with the society, culture, and even history in a complex manner. Van Dijck (2007, 1–26) stresses these cultural effects on memory and rather favors the term "personal cultural memory". There are certain cultural frameworks of one's past stories like a baby's first steps. These frameworks guide us to remember or even record certain events of our lives. (ibid.)

2.2.2 Limitations and Extensions of Memory

As Norman (2002*a*) mentions in his book, *The Design of Everyday Things*, our knowledge or information is saved in two places: in our heads and the world (cf. van Dijck (2007, 27–52) who suggests three categories: embodied and enabled memory, and embedded memory, which refers to the sociocultural aspects of memory). In other words, something we know—remember—is knowledge in our head. What we remember can be divided into two major types: short-term memory (STM) and long-term memory (LTM). STM, the working memory, deals with the present. It is

fast, instant, limited and replaced by new information. By contrast, LTM is for the past and interpretation of our experiences, which are reinterpreted over and over. It takes time and effort to store information to and retrieve it from LTM. Capacity-wise, LTM has no issues, but organizing it is rather problematic. We might not have full access to it when needed. To ease the burden, the drawbacks of the capacity of STM and the accessibility of LTM, we store some of our knowledge to the external world. (Norman, 2002*a*, 54–80)

We can only deal with a certain amount of information at a time. Our memories are always reinterpreted and recreated every time we retrieve more, and they are never going to be the same. Sometimes, we have trouble recalling memories. When we want to share certain memories with others, showing an image of the moment is rather efficient compared to describing it verbally. Thus, we have been looking for ways of extending our memories. We cherish some objects as reminders that trigger our life stories (see Csikszentmihalyi and Halton, 1981) and try to seize moments and save arbitrary things by using media technologies: pictures, photos, songs, memos, videos, blogs, diaries, phone books and calendars. These mediated memories are one's efforts to seize the moment. Whenever we access mediated memories, we want to see the same elements of the past (van Dijck, 2007, 1–26).

As we live in the digital age, digital media are widely used for memory products. Van Dijck (2007) notes the migration of mediated memories from tangible archives to digital media files like digital photos, video clips and blogs, versus a shoebox filled with cherished items from the past. The biggest change is that due to the format, memories can be accessed with different digital platforms and shared with others at a distance. Thus, mediated memories have more influence over social interactions through various social networks ranging from a family to society at large. (van Dijck, 2007, 1–76) By favoring mobile devices as an extension of our memory, we reduce the burden of the physical volumes of memory-related objects and promote their use in diverse ways. The increasing dependency encourages us to find ways of keeping memories in a safer way, and to offer more options to reach memories. Even if we lose the access points such as our mobile phones, we would not lose the content.

2.3 Parent- and Babyhood Experiences and Memories

Having a baby is one of the most intimate and emotional experiences of human life. It could be the happiest time for both the parents and the baby, but it could also be an extremely hectic time with overwhelming information, tasks and changes, especially for the parents. Although a baby usually gets all the attention, parents are the main agents of forming the experiences and memories. Moreover, a baby totally relies on his/her parents. It is crucial to fulfill parents' needs before they get stressed, and make them focus on their baby and happiness at the time, rather than feeling lost with new demands and changes (see Hassenzahl et al., 2013).

According to Stevens et al. (2001), "People identify themselves most strongly not in relation to the civic or occupational roles, but in relation to their roles as parents, children, siblings and generational continuances of their family." Hence, parent- and babyhood memories will be recalled numerous times during family events or other social occasions, even for a few generations. Since an adult cannot recall the memories of one's own babyhood, due to infantile amnesia (Meltzoff, 1995), one needs to depend on parents' reminiscence or mediated memory products. In general, parents do have the desire of recording and sharing the precious moments as much as they can, yet they are not sure which moments in time need to be preserved (see Stevens et al., 2001; Kientz, Arriaga and Abowd, 2009; Jomhari, Gonzalez and Kurniawan, 2009). They also tend to forget to capture those moments. Gently reminding and guiding parents would be very much appreciated.

As van Dijck (2007, 1–26) notes, the cultural frame works in favor of memories. There are some mutually agreed guidelines for raising a baby, such as developmental milestones, vaccinations, and feeding a baby. However, people in general are not interested in the information until they are confronted with the situation. One reason can be that the knowledge about a baby's growth is only significant at the time and that it is a short period within the family's life.

There is a link between the developmental milestones and cultural frameworks for memories. Through bridging existing baby-related services together with the help of ICT, parents could focus more on the interactions with a baby, the experiences. Thus, more experiences can be fostered as family narratives, which eventually enrich the social interactions of the family and can positively influence on a baby throughout childhood, adolescence, and even their whole life.

Chapter 3

Benchmarking

Although I had some ideas for a tool, based on my experiences, I did not know what tools already existed. To analyze the existing solutions, I conducted benchmarking. By one definition, "Benchmarking is the practice of being humble enough to admit that others are better at something and being wise enough to learn how to match and even surpass them at it." (APQC, 2010). I used *APQC's Benchmarking Methodology*, which consists of four phases: planning, collecting, analyzing, and adapting. I checked what tools were out there and what features were supported by them in order to discover the best practices for my own.

Recalling my time with my son when he was a newborn, a mobile phone was the most practical device for me. Therefore, my benchmarking focused on digital media, mainly mobile apps (applications) and a few web services. Initially, I skipped Neuvola (the nationwide Maternity and Child Health Care system) brochures because of the language barrier. It would have been good to analyze how Neuvola deals with the information, but I thought I could find similar cases from other sources without the language issue. According to Hakulinen-Viitanen, Pelkonen and Haapakorva (2005), Neuvola supports interaction between children and parents to improve the health and wellbeing of whole families, with multi-professional co-operation. Professionals, such as public health nurses, physicians, physiotherapists, psychologists, speech therapists, occupational therapists, nutritionists, family workers are part of the services (ibid.).

I started by checking mobile apps, and based on the findings, it seems they are mainly tracking tools. There are a few information offering tools that are usually based on web content. These information offering apps are treated as a secondary service that operates together with the main web service. Some apps are provided by baby product companies and, in addition, are partially used as a promotional channel. Most apps include a photo album feature. Some even have a notebook or diary feature for recording memorable moments. It seems that these data are treated as additional features, not as important as tracking or information offering. As an example of a personally-motivated baby tracking, I found a blog run by a father, *The Trixie Update* (MacNeill, 2003), which tracked his daughter's daily routine so that he could understand and take better care of her. Later, he created *Trixie Tracker* (Trixie Telemetry, 2004), a tracking tool, based on the collection of charts, graphs and designs first seen on his blog. There is a colorful range of specialized tools—even an app for examining baby poop, *Absolute Agidong (Baby Poop) Solution* (Maeil Dairies, 2011), as seen in Figure 3.1.

Figure 3.1: Absolute Agidong (Baby Poop) Solution

I have categorized the tools that I have evaluated into two types: tracking and information offering. The division was made based on the key function of the tool. In other words, some information offering tools also have tracking features, but as a secondary feature. Likewise, some tracking tools offer developmental information as a minor feature. Tracking tools are mainly mobile phone based, and a few of them feature a web service for synchronization. Information offering focused tools are ex-

tensively web-based services. Mobile apps are later additions created for the sake of better accessibility. These mobile apps tend to be lightweight and only support one or two years of baby development information. They invite the users to the main web service for more details. For the sake of completeness, I analyzed both interfaces if available.

3.1 Tracking

Most baby-related apps are tracking tools that enable the user to log the baby's activities: mainly feeding, sleeping, diaper changes, and growth. Some tools also track bathing, developmental milestones, mood, locations, vaccines and doctor visits, and support a user-defined timer. Feeding is divided into nursing, bottle feeding, breast-milk pumping, and solid food. Time, duration and quantity are the main parameters for these logs. The growth log is categorized by weight, height, and the head circumference. WHO (World Health Organization) growth charts or average growth charts are typically offered as comparison points.

Some of the tracking tools support synchronization among several users, in particular caregivers, so that parents can monitor a baby's activities remotely. The visualization of logs helps to understand a baby's statistics that show overall trends of the day, week, or month. A reminder can also be created based on them. Photo albums and diaries are common additional features, something that can be more memorable in the long run. Most tools support certain ways of exporting logs: back up, sync, *Facebook*, *Twitter*, text messages, and email. The tracker applications I evaluated can be found in Table 3.1 together with some observations.

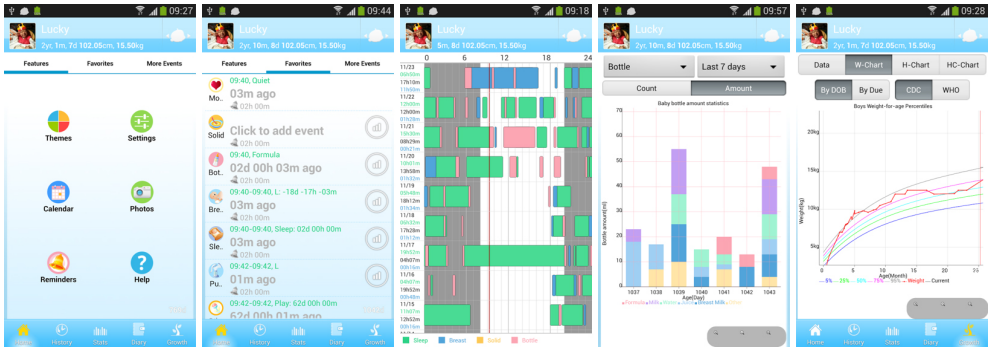

Figure 3.2: Screenshots from Baby Care

Tracking tool	URL	Notes
Total Baby	http://www.andesigned.net/ totalbaby.htm	developed by a parent, sync (Wi-Fi or Cloud Syncing Module)
Baby Connect	http://www.baby-connect.com/	sync (Web) - monitoring
Baby Log Lite	https://itunes.apple.com/us/app/ baby-log-lite-activities-growth/id404137852?mt=8	designed by two mothers
My Baby & Me	http://www.avent.com/ mybabyandme/	Philips, one baby, no backup
Baby Care (see Figure 3.2)	https://play.google.com/store/ apps/details?id=com. luckyxmobile.babycare&hl=en	multiple widgets for the home screen
Baby ESP	http://www.babyesp.com/	sync (Web) - monitoring
Trixie Tracker	http://www.trixietracker.com/	designed by a father, sync (Web) - monitoring

Table 3.1: Baby Tracking Tools

3.2 Information Offering

Information on a baby's development can easily be found on the Web, books, or through brochures from Neuvola or a maternity hospital. As development is closely linked to a baby's age, a lot of the information is presented in chronological order. Common examples are the average expected development, advice and tips, such as when to expect the first teeth and how to soothe them. However, based on my experience, parents, especially with their first child, are initially fully occupied by the baby. They do not have time to sit and scan through all the available information, and they do not necessarily know what to look for. Proper timely information is very useful, but if it is not personalized for the parents, it takes some time to find it. Some relevant information is not tied to a certain moment.

The resources are scattered everywhere, and not all the sources are credible. It seems widely used information-focused tools are mainly web-based, with an optional mobile interface. The first case I studied, BabyCenter, offers verified information via web and mobile apps. *My Baby Today* (BabyCenter, 2013) is a mobile app from BabyCenter. *WebMD* (WebMD, 2005) has a category called Family & Pregnancy, where baby related information can be found. *WebMD Baby* (WebMD, 2013) is the app from WebMD. The company called What to Expect offers parenting information on the Web and *What to Expect Baby Tracker* (Everyday Health, 2012) is their app.

The app from BabyCenter was focused only on information offering, whereas the later apps feature both information and tracking.

3.2.1 BabyCenter (Web)

BabyCenter (BabyCenter, 1997), according to their own statement, is the biggest baby portal that offers pregnancy and parenting information. *BabyCenter.com* (Figure 3.3) has five big categories: expert advice, community, blog, products & gear, and global giving. Expert advice is mainly about timely growth and thematic information. Community and blog are comparable to other SNSs (social networking service), except slightly more geared toward parenting. Product & gear is for promoting and testing baby and toddler related products—a sort of advertising channel. Global giving introduces nonprofit organizations dedicated to motherhood.

All in all, BabyCenter has 14 different locally owned and operated sites, so each site is slightly different from each other. However, expert advice, community and promotion are always the common categories of the sites. The most fundamental service is providing a personalized home page and an email newsletter with expert advice tailored to the user's current needs. It also offers three mobile apps based on the web contents: *My Pregnancy Today*, *My Baby Today*, and *Birth Class App for iPad*.

3.2.2 My Baby Today (Mobile app)

The main function of the tool (Figure 3.4) is offering baby development information based on a personalized daily calendar. It also has a checklist, photo album and access to a community, *Birth Club*. The calendar only lasts for a year, but after that parents can still check growth information by age on the *BabyCenter* website. The calendar offers baby growth info, a helpful checklist and reminder, answers to common worries ("Is this normal?"), suggested activities, caring and feeding advice, reminder of caring for the mother, reasons to laugh for the sake of stress release, and what to celebrate. The checklists and reminders in the calendar can be added to a user's checklist easily by tapping. Users can create their own checklist items as well as choose from existing ones which are shown in the calendar.

Figure 3.3: The main page of BabyCenter web

The *Birth Club* initially leads to an automatically generated community based on when the baby was born, such as "January 2014 Birth Club". Afterward, users can navigate through all other communities that exist on the *BabyCenter* web. A photo album can be found under the My Baby tab, where the baby's personal data can be saved, but only photos and birth information. Photos can be imported from a mobile camera or a photo library, which lets the users utilize photos from other apps.

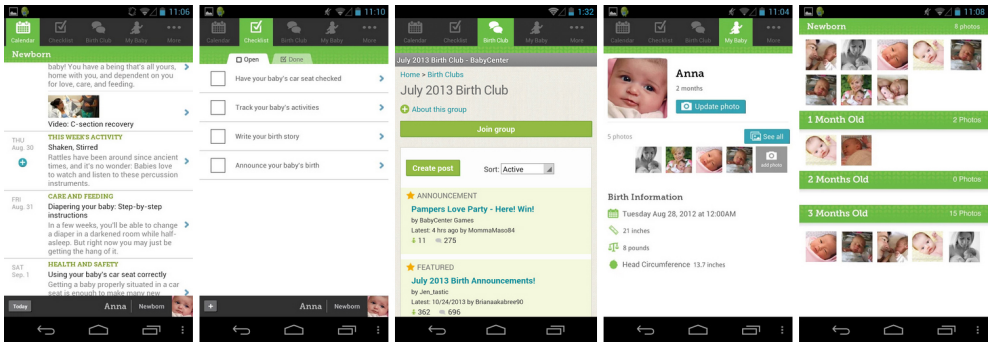

Figure 3.4: Screen shots from My Baby Today

My Baby Today (BabyCenter, 2013) appears to be informative and trustworthy, since all the medical information featured in this app is reviewed by a group of medical doctors and other experts, the BabyCenter Medical Advisory Board. Personally, the

idea of taking care of mothers was eye-catching. People often forget about mothers after a baby is born, even though the mother still needs to care for herself both physically and mentally. This app reminds its users about an important part that can be easily disregarded, namely the mother's health. If the app also proposed tips for the father, it would be even better. What is missing from the tool is personalized baby information and memory, as it only provides space for photos and birth measurement information. In an optimal case, there needs to be more space for the baby itself.

3.2.3 WebMD

WebMD (WebMD, 2005) provides expert information, supportive communities, and in-depth reference material about health related subjects. One part of the service, the Family & Pregnancy category, deals with baby-related information. I focused on the Newborn & Baby section. At first glance, the main page looked like a baby magazine (Figure 3.5). It was all about the baby, but it looked like as if all the content was scattered around the main page. I found timely and thematic information categories near the bottom of the page. Plain simple text categories were the least appealing item on the whole page. Each item seemed pretty intriguing in itself, but I had difficulties navigating around. The site also features interactive content, including the *WebMD Baby* discussed below.

3.2.4 WebMD Baby

The *WebMD Baby (WebMD, 2013)* app gives quick access to—according to the company—trusted and physician-approved baby health and wellness information (Figure 3.6). The app can be used for several children in a family simultaneously. It lasts until the age of two years. The content available on the mobile app is divided into four main categories, shown as tabs (see Appendix A).

The app has two different approaches to the information: timely and thematic, which impove the accessibility of the content. If parents face an urgent issue, thematic information would be easier to look for. Otherwise, timely information would be more relevant in an everyday situation. In Baby 101 there are specific categories (Just for Moms and Just for Dads) for parents. I appreciate the fact that the tool cares for the parents, too. Parents also need encouragement and care to adapt to the

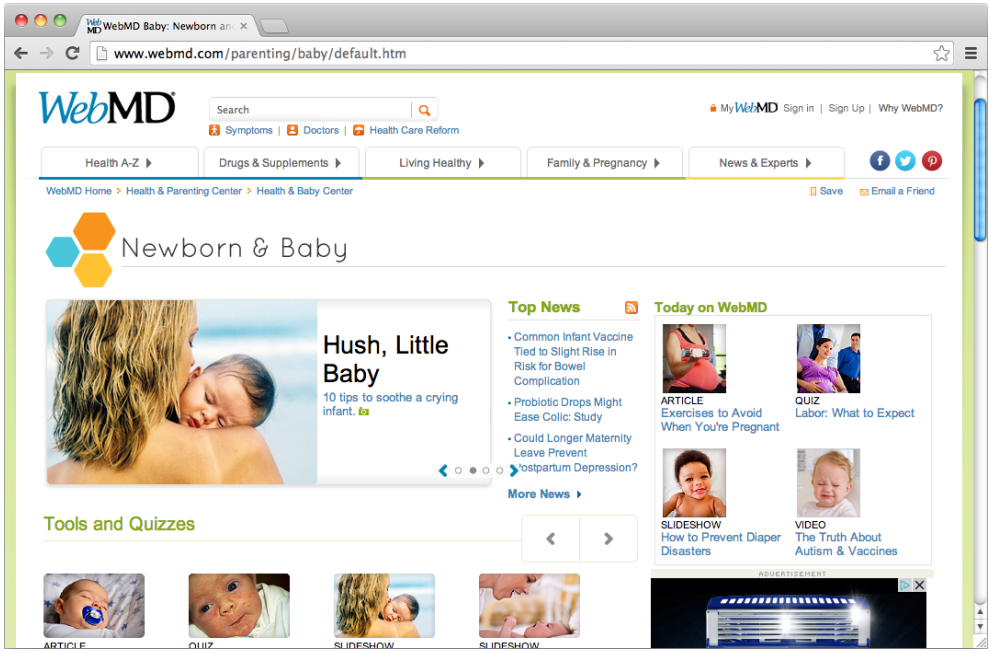

Figure 3.5: Family & Pregnancy page on the WebMD site

changes brought by new situations in life. The tool tries to serve various purposes by offering a few different tracking tools, notes and thematic photo albums.

The purpose of the Notepad was hard to grasp: is it meant to be used as a checklist or for saving notes on baby development? If it is a checklist, it would be good to have a reminder function, and for the latter case it should be combined with the BabyBook. The themes of BabyBook are good hints for parents concerning what kind of memories could be retained, but it is somewhat limited in features. Parents might want to add their own photo album or some notes only for a certain occasion, which is not possible. There should be more flexibility in the section that deals with baby memories. Some categories have a deep navigation structure (up to five steps) that discourages their use.

3.3 Lessons Learned from Benchmarking

Before benchmarking, I thought that baby-related information was badly scattered around various sources and not useful when it was actually needed. I also did not expect tracking tools to be of much use. However, there are tools that have tried to

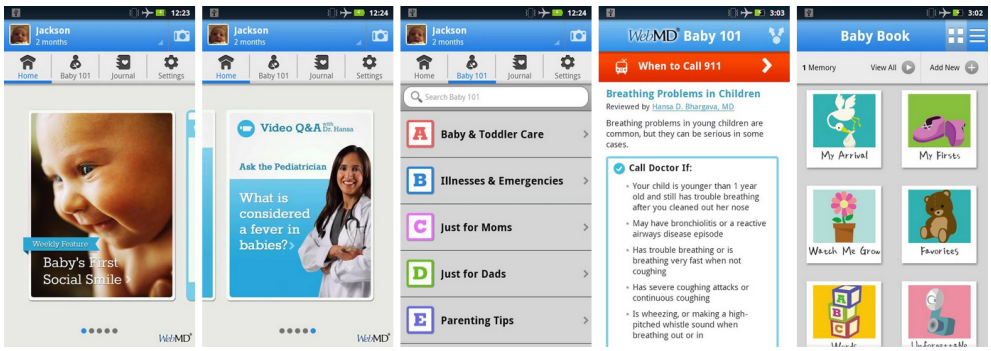

Figure 3.6: Screenshots from WebMD Baby

be more accessible to new parents. It was useful to conduct benchmarking, so that I could collect the pros and cons of the existing tools, and would not need to start from scratch. All in all, benchmarking turned out to be a helpful method that supports the design process.

I expected that information offering through a personalized calendar in a mobile app would be a worthy solution for new parents. Indeed, there are tools like that and it seems that the users who have used such tools, have really appreciated them. Personally, I especially liked the information that those tools offered directly to the parents themselves. When a baby is born, it seems all the attention is focused on the baby, even though the mother still needs further care. The father also needs some advice for adapting to his new role. Recalling my own experiences, I think those aspects were quite easy to forget. Baby-related information is surely crucial, but information related to being new parents provides a smoother landing regarding the changes brought by the new situation in life. The way *WebMD Baby* offers tips would be a good starting point for my project. Both timely and thematic information can support new parents who do not have the time or the knowledge to search around, as well as for parents who are curious about certain topics.

Tracking tools can be very useful, particularly when a baby is small. It is a good way to find out about a baby's daily routine or check the basic well-being of a baby. A growth chart can show the basic health info as well as offer some emotional reward to the parents. In a way, the result of their time and efforts is shown by the chart. In some cases, parents can predict a baby's schedule based on the visualization of tracking data like in *Trixie Tracker* (see Figure 3.7).

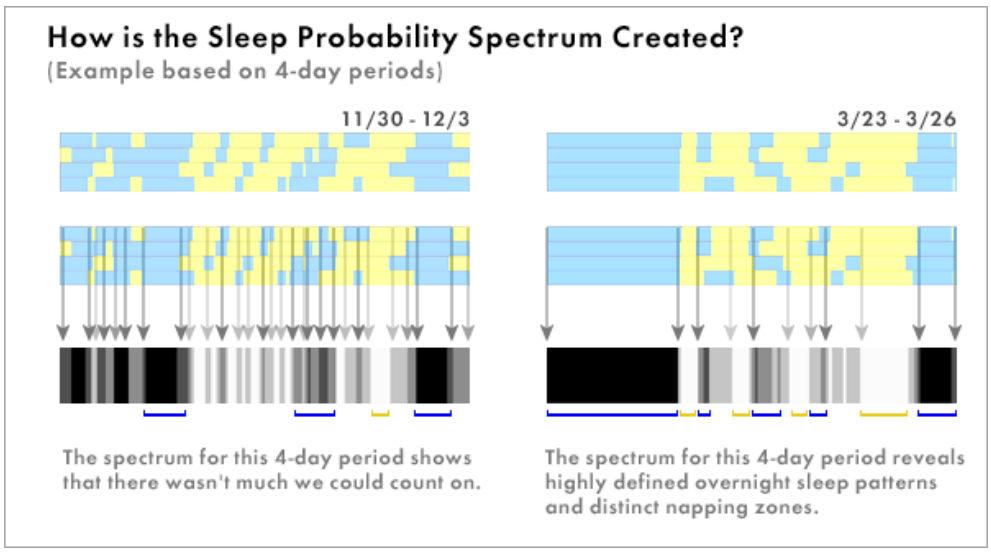

Figure 3.7: The logic behind the Sleep Probability Chart from Trixie Tracker

Many of the tracking tools are targeted for the United States, where parents typically hire a caregiver for a baby, since mothers are inclined to return to work when the baby is still small (see Laughlin, 2011). This can be a reason why tracking tools are rather popular and support synchronization among several users. Routine communication between parents and caregivers could, to a certain extent, be replaced by using such tools effectively. However, that would not have a significant impact on parents living in other countries, for instance, Finland. A combination of short-term disability, sick leave, vacation, personal days, and unpaid family leave (12 weeks) is treated as the maternity leave in the United States (BabyCenter, 1997), whereas Finland offers a maternal leave (105 working days) for the mother, a paternal leave (54 working days) for the father, and a shared parental leave (158 working days), all of which are supported by an allowance from the government (Kansaneläkelaitos, 2013). If the parents want to keep their child at home until he/she is three years old, child home care allowance can be claimed (ibid.). On average, Finnish mothers stay at home until the child is about two years old (Salmi, Lammi-Taskula and Närvi, 2009, 35). Therefore, tracking tools do not need to be shared as heavily as in the United States. This example shows how local social practices need to be taken into account when designing for an international target audience.

I searched for some growth-related information every now and then when my child was a newborn, but I did not come across these tools. I was able to find information mostly on webzines, online communities and books, yet I was often not sure what

I was supposed to be aware of. Some of these sources gave me an idea of tracking baby activities such as pooping (diaper use), breastfeeding, and sleeping. I even tried to follow diaper consumption with a rough paper-based tracking tool, but it turned out to be rather tedious and easy to forget. I would have appreciated knowing some of the aforementioned tools at that point. Some tools are actually made by parents who suffered from the lack of information or tracked a baby's activities intensively. All this points toward the need for an accessible tool. I found the tools only now, when I started doing the thesis project, since I had more time, patience, energy and motivation to conduct an intensive study. Thus, the visibility of the tool needs to be considered.

All the tools benchmarked here include photo albums and some even feature a notebook or diary for storing memories. The features are simple, but not well-defined. It seems as if they were provided mostly for the sake of completeness. However, the data has significant emotional value, which will also remain in the future. Of course, growth measurements and other tracked activities are also invaluable, even later on. Information and daily tracked activities are useful at the very moment, but may considerably lose their value by time. I would like to give more careful consideration to the data that a user would want to keep longer. In addition, more flexibility is needed for dealing with emotional content.

Each tool emphasizes certain features, and additional features are somewhat hidden. For instance, *WebMD Baby* covers most features that I found by benchmarking and has good categories for the photo album. Even though the tool gives good hints concerning what to keep by labeling the categories, the categories tend to hide the actual content. It could be tedious to go to a slightly deeper level to save certain moments that are equally, or even more valuable from the user's perspective. To compensate for this, *Baby Care* supports multiple widgets on the home screen. Furthermore, the use frequency of each feature can change by time. The need for most tracking tools fades away when a baby gets older. Perhaps, some sort of dynamic setting option for the structure would be worth exploring.

All the tools have a reminder feature, which can be of great use. I often felt blank after intensively taking care of my baby. Reminding to record important moments is crucial because time distorts the memories and makes us forget the facts. On the other hand, if a tool reminds about everything, it will be annoying. Likewise, if there is an alarm at night, it has to be more subtle than during daytime.

Chapter 4

Interviews

The needs for a tool initially sprang from personal everyday complaints or inconvenience. I wanted to confirm if it was only me or my situation causing the situation where I did not have good information access here in Finland, or was it perhaps the language barrier. I chose to interview others to assess if the idea was valid for them, too, and whether they had similar requirements for a tool. Furthermore, as we saw in the previous chapter, some baby-related mobile apps were created by parents themselves, which partially proves that there is demand for a custom tool or service to enrich the beginning of the parenthood. The outline of the interview can be found in Appendix B.

4.1 Conducting the Interviews

Before the interviews, I also considered a focus group as an alternative approach. A focus group would have been good for encouraging interaction among the participants and for building collective ideas during the session (see Preece, Rogers and Sharp, 2002, 396–397). However, scheduling the time for a focus group was problematic, as most interviewees were mothers who are on maternity or parental leave taking care of their baby. They have their own daily routine based on their babies' rhythm. Fathers normally work, so they have little free time for the interviews; mostly in the evenings or on weekends, when babies get a lot of family attention. It was difficult to organize a suitable time for everyone. One interviewee lives far away from

the rest, so the distance was also an issue. Another reason for not going with a focus group is that they tend to have verbose and quiet participants (ibid.).

To get everybody's voice heard in the results, and to minimize time and location issues, I decided to conduct one-to-one interviews. The interview was semi-structured, meaning it contained both closed and open questions (see Preece, Rogers and Sharp, 2002, 394–396). I started with my own struggles of being a mother to prompt the interviewees to share their experiences, tools and needs. This way starting became smoother than just diving into the questions. My stories sometimes brought about some suggestions by the interviewees and inspired them to think of what they would need or appreciate.

My basic approach was that every baby has got a different personality and preferences, together with their parents' personalities, which create unique parent- and babyhood. This helped to not intimidate the interviewees, so they could share their own unique experiences and needs more comfortably. Naturally, I asked a few common questions to keep the interview within the scope of the topics of interest to myself (cf. Preece, Rogers and Sharp, 2002, 390–391).

One interviewee lives in Tampere, so it would have been time and money consuming to conduct a face-to-face interview. The interview could have been arranged through an online chat service, but then we would have needed to type everything, which would have been tedious, but also helped with archiving the content. Since talking rather than writing makes the setting of the interview more casual, the interviewee tends to share his/her personal experiences more (see Preece, Rogers and Sharp, 2002, 106–128).

Since the scope of the project was the first year only, I interviewed an expecting mother and parents who have a baby under two years of age in Finland. I expanded the interviewees to parents who have a baby under, not just one, but two years old, as I think they can reflect on the time and still experience the huge changes everyday. They can already better see the changing needs within the big picture. I conducted seven interviews in total:

1. Dutch mother – Dutch couple
2. Expecting Korean mother – Korean couple
3. Korean mother – Korean couple
4. Finnish mother – Korean–Finnish couple

5. Finnish mother – Finnish couple
6. Finnish couple together
7. Finnish father – Finnish couple

I interviewed two fathers to get a glimpse of fatherhood and their perspectives on baby growth and memories. From the expecting mom, I wanted to hear what kind of information she would expect and how aware she was of the forthcoming needs. The main focus questions concentrate on the main information resources and how they share or record important moments with others.

4.2 Observations

Reflecting on my own experiences was a good starting point for the interview, as all the parents share at least some common ground. In essence, they need information, they want to record the moments, and there is a social aspect to being a parent. The idea, mobile as a main tool, echoed well with them.

4.2.1 Information

Babies grow immensely, particularly during the first year. According to the interviews, the key information related to baby development can be overwhelming, and a lot of it can be found in various sources. The information needed at each moment changes weekly at the beginning and later, roughly speaking, monthly. Not all the information is reliable, either. Taking care of a baby is already a huge everyday task for new parents and it is easy to feel lost. They do not have enough energy or time for looking for the right information at the time.

All the interviewees agreed that timeline-based growth related information would be very useful. Most parents doubted the information found on the Web, but still checked some. One mother said that reading about babies with similar issues made her feel safe and relaxed, but she did not look for the solution from the stories. Finns considered Neuvola as the best reliable source, so they wanted the timely information to be linked to Neuvola.

Average baby growth graphs that show height, weight, and head circumference would be appreciated. Parents wanted to compare their babies' overall growth to the average. During Neuvola visits, parents can check the graphs with nurses, but they are not available afterward. An access to the graphs anytime was demanded. Some even wanted the collected data to be visualized later for some kind of hands-on archive.

There is a Finnish web-based service, *Kasvukäyrät* (Dunkel et al., 2010), that enables to predict the growth of a baby based on the parents' heights and baby's measurements (height, weight, head circumference), but the overall user experience is not friendly. For example, the gender selection is hidden. It looks more like a decoration, not a check box. Users can input only maximum three different growth measurements, and the data and graphs are not saved. The site seems not fully compatible with Chrome, Firefox, and Safari, which highlights the importance of cross-platform testing.

The expecting mother was not sure if she needed to do or prepare something before giving a birth. She also mentioned issues, such as the feeding time, diaper change time, and the kinds of food that can be fed or must not be eaten. Another mother, who had an 11 month old boy, said that tracking the daily routine was not a valid concern any more. However, in general food and feeding were among the most common topics of interest.

The couple, who have already got two older children, ware more relaxed about timely information than the rest. The father wished to check the older children's timeline record to compare to the baby. He assumed there must have been similarities among the siblings. In his case, it would be helpful for the baby and pleasant to scan through how the siblings were at the same age.

After babies start getting active, such as crawling or walking, parents interests shift toward more interaction with babies. Questions in the lines of "What kind of activities or toys could help baby development?" became the focus. Where to take a baby for new experiences and baby-related events were interesting topics. What can be fed to support the development, such as finger food, was also an intriguing topic. Toward the age of one year, daycare information, such as when to apply, what is a good time to join, and what are the options, were among the biggest concerns.

Most Finns agreed that *Neuvola* was crucial. The information from it is verified and reliable. The regular check-up service helped them to be sure of the baby's health.

One Finnish mother said the Neuvola phone hotline was useful when her baby had a high fever. One Finnish father mentioned that the brochures handed out at Nevola during each visit were very useful. For him, it was proper timely information and very interesting. Due to the nature of the brochures, they were discarded or piled up somewhere, after which he was not tempted to check them again. He would like to have had a tool where he could check the info easily such as in the brochures, but in a frequent manner.

In contrast, foreign mothers tended to give less credit to Neuvola. They check development information from various sources, such as the Web, mobile apps, books, home country health care system, relatives, and friends. One Korean mother heavily depended on the mobile app service from BabyCenter during her pregnancy and the first year. *BabyCenter* (BabyCenter, 1997), as discussed in the previous chapter, is one of the biggest worldwide pregnancy and parenting information services. She complained that Neuvola was not actively helping her. Her nurse had even encouraged her to rely on the Korean health care system, since she had been traveling to Korea every now and then. It seemed that the language barrier made Neuvola much less desirable for foreign parents.

4.2.2 Recording the Moments

During a child's first year, mainly the mother looked after her baby, due to breastfeeding. Thus, recording the growth was mostly done by the mother. The father was likely to be the second person, but both hoped to do it together. Another noticeable tendency was that parents were eager to record every single moment of the first child. The amount of captured memories regarding the first child was far greater than for their younger children. Similar records might have been helpful for the second and third child as well, but it seemed that recording became less frequent.

All the interviewees tried to keep some track of the baby's growth. Some still used traditional means, such as a baby book, partially. Most people depended on various new media, such as blogs, mobile apps, e-mail, instant messengers, text files, SNS and a mobile calendar. Since baby photos are taken with a digital camera or mobile, there has clearly been a shift toward new media. Those who still use a baby book gained inspiration from it (see Figure 4.1 for an example, translated in Appendix C): they started thinking of what content could be archived, or treated the book as a

tangible archive of babyhood. The family that already had two older kids had a baby book, filled in by older siblings. The book seemed to enhance the emotional tie between the siblings and the whole family. The Dutch family had *Flickr* accounts for each child as a medium to share memorable moments with relatives and friends in the Netherlands. *Skype* messaging between parents was utilized as a recording tool by another couple. It could be as instant and casual as chat, and the software would automatically timestamp the messages. Later, when the parents had time, they would trace back the history of the chat and tidy it up more formally. Parents' SNSs, like *Facebook* and *KaKaoStory*, accounts were partially used, too. In this case, scanning or extracting the baby records is not efficient.

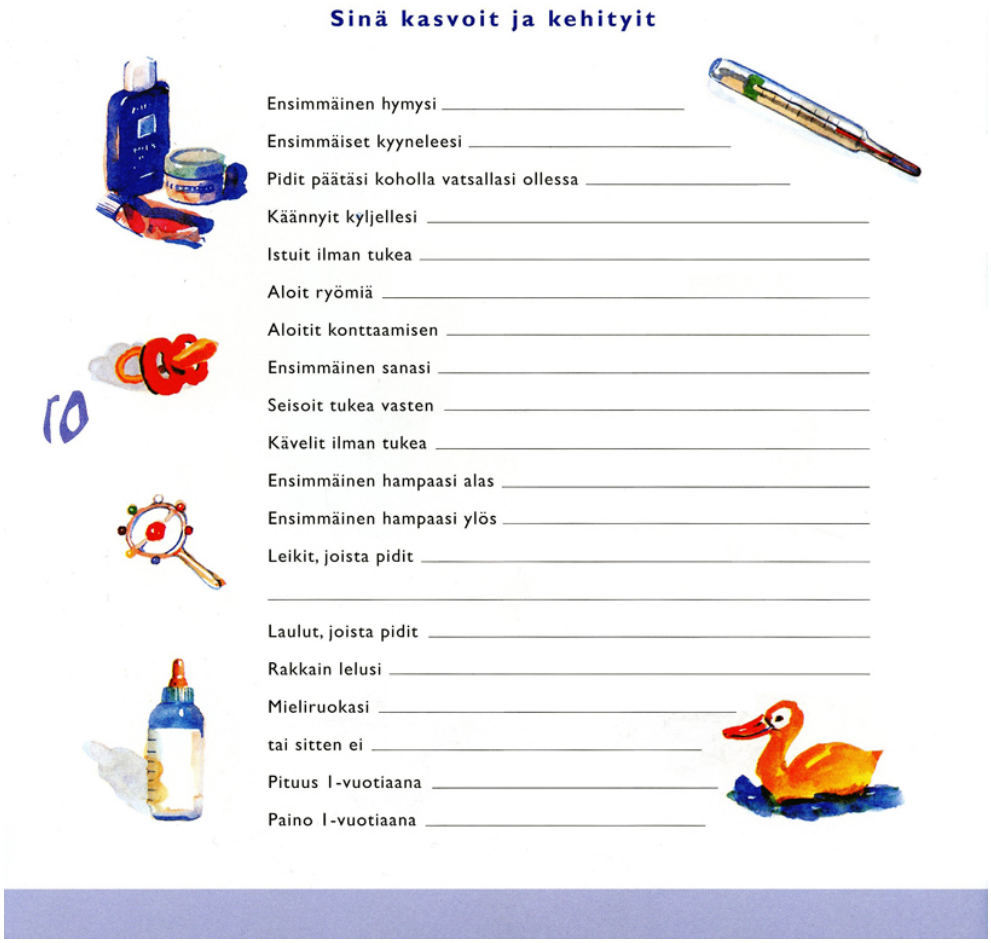

Figure 4.1: A page from *Ensimmäinen Vuoteni (My First Year)*, the Population Register Centre's baby book given to the parents of a newborn at the maternity ward (Väestörekisterikeskus, 2010).

Easy and quick access, inspiration, encouragement or hints for recording, a good overview, archiving, exporting and back-up were the main requirements for the tool. Babies should have their own growth timeline. At the very moment, when a baby reaches a certain milestone, if parents could reach the tool easily, they would not need to spend more time for recording it by recalling the moment from distorted memory. Parents might even forget the whole thing later. Mobile as the primary device for the tool would be most suitable because of its nature. People tend to keep a mobile phone within their reach almost at all the time. All interviewees agreed with this idea.

If there is some inspiration concerning what to expect or what could be an interesting memory, parents are more ready to engage in the moment and record it. For example, a father's story about the baby's birth could activate other involvement and help him discover different angles of the birth. Likewise, each family member's day-out with the baby as a theme would prompt them to spend more time with the baby. Later they could enjoy the content including photos and some text from the day-out. In other words, the tool should suggest themes or keywords that can inspire parents to engage themselves in various activities with the baby or that can be used as tags and pointers on how to sort the records in various ways. I got some keywords from an interviewee's text file: laughing, going out to party, flying, swimming, yelling, turning, tooth, belly pushing, clapping, crawling, word, walking, first word. One way of suggesting would be a pre-made timeline of the baby's growth linked to verified information. Several interviewees mentioned about back-up, exporting, and a physical baby book as ways of long term archiving.

Photos are one of the primary methods of capturing babyhood and parenthood. Because of the availability of mobile phone cameras of good enough quality, a lot of photos are taken with them. Hence, the tool needs to be linked to the gallery or camera of the mobile device. Photos are not only taken by parents, but also by other people. An easy way of collecting the photos taken by others was requested.

One interviewee enjoyed the photo editing functionality of an SNS photo gallery, as she was not fluent using photo editing tools like *Photoshop*. She would like to have the function also in the new tool. Photos with short comments would make it easy to recall when the photo was taken. Tags or keywords could be a good solution to sort the photos. For example, it would be interesting to see the baby in front of a washing machine at five months and eight months. At the end, many parents wanted to have a

tangible photo book. Some sort of editing for the photo album export will, therefore, be required.

4.2.3 Social Aspects

Before the interview, I simply thought foreign parents would use online channels for sharing their baby's growth. The interviews revealed that they did, indeed, utilize them—as well as Finnish parents, since not all of them live close to their friends and relatives, especially grandparents. Blogs, *Flickr*, *KaKaoStory*, *Line* and *Facebook* were mentioned as sharing channels. An interviewee mentioned a privacy setting to limit who can access the content. Some baby photos or content could be very personal, preferably shared with only family and relatives, yet they still need to be managed with the same tool.

The preference for a *community* was divided. A community could attract parents with same-age babies and provide group support. Some parents had already experienced or expected to share the parenting experience in discussions and comments, and recycle baby clothes through it. Others mentioned dealing with non-experts: peer support is not reliable, but offers sympathy and comfort.

4.2.4 Media

Many agreed that a *mobile phone* is handy and easy to reach every now and then, also while taking care of their baby at the same time. A mobile app could be a main tool, but the content could be shown in other media, such as the Web. One channel for a baby would be optimal, since the huge amount of digital data from different devices tends to be spread here and there. Due to the digital nature, date and time can be automatically extracted from the content—the metadata. As the content can be modified numerous times, writing or recording would be more instant than traditional means, such as a baby book. This would encourage parents to produce more content casually without stress.

Two mothers were using baby-related mobile apps for information, tracking, and printing photos. They would like to have something more extensive as a mobile app. Everybody was using a mobile for baby photos.

A baby book was used selectively. The digital format of photos discouraged the use of a baby book. To fill the baby book, photos needed to be printed. As noted by one of the parents, it is rather time consuming to go through the photos and get the printed ones. Writing on the book would depend on the memory. There was one interviewee who wished to complete the baby book for the memory as a concrete object. He made notes of the happenings and dates, and planned to expand those later. Entering the content was such a huge task that he did not have time to sit down and take a look of the book. However, he definitely believed the book would be very personal and serve as a good memory item for both the parents and the baby.

4.3 Lessons Learned from the Interviews

All the interviews went smoothly with a joyful atmosphere. I was able to share parenting experiences and ideas for the tool with other parents and confirm the demand for such a tool. The interviews resulted in me seeing and understanding diverse angles toward parenting a newborn.

The opinions toward Neuvola were clearly polarized between Finns and foreigners. The language barrier has made foreigners, including myself, feel lost and hunt for information on their own. By contrast, Finns are generally satisfied with Neuvola. I have also heard positive comments from other Finnish parents apart from the interviews. Although I had skipped the benchmarking of Neuvola-provided material because of the obstacles and partially my mistrust of it caused by the difficulty, the interviews have prompted me to reappraise the value of Neuvola. The experience stemming from benchmarking and the interviews enabled me to see the bigger picture easier, as I am now aware of the overall contents offered by baby-related services.

I realized through the interviews that parents want to have one integrated channel for information and recording babyhood. In a way, it is hard to separate timely information and recording the moments, since the growth of a baby is the key element in both, and is related to time. Milestones of development are the favored moments to keep. One channel does not mean using only one medium—parents would rather want to utilize various media for different purposes, but the source of the content should be one. For instance, using a mobile device was favored for getting timely development information and recording the moments, due to its accessibility, whereas they also wanted to share the moments with others through the Web. Moreover, the Web could

be used as a backup, as well as for looking for further detailed information. Using diverse media for one channel requires synchronization, which would enable parents and also other caregivers to use the tool together with his/her own device. This would fulfill the desire of contributing to the record together and minimize missing memorable moments.

Parents who have more than one child are not keen on general development information because they have already experienced it before. In contrast, the data or records of older siblings act as a comparison point, would be rather intriguing to see. The older siblings' record hopefully encourages parents to leave more records for a younger child and the siblings in order to accept the new family member smoothly. I believe this was one of the best outcomes from the interviews. As a tiny confirmation of the finding, the idea was much appreciated by parents who have two or more children when I presented the idea at the MA seminar.

Chapter 5

Scenarios and Requirements

One's life consists of a collection of stories about people and their surroundings: in short, personal experiences. As ICT pervades our lives extensively, designing under the constraints set by technologies is no longer static. It is less about shaping physical objects, and more about creating interactive services and experiences that become part of a user's life. Therefore, scenarios, stories about people and their activities (Carroll, 1999), are used by designers during the development process, as a means of communicating design concepts with other stakeholders, a thinking and design tool, and an artifact in testing (Nielsen, 1995*b*). Scenarios depict a plot, sequences of actions and events with other characteristic elements such as a setting, agents or actors, goals or objectives (Carroll, 1999). They help everyone invovled in the process to share a common understanding of the context.

5.1 Creating the Scenarios

The service aims to be a part of everyday family life with a baby and, eventually, a staple set of memory items of the time. Describing possible episodes in parent- and babyhood can inspire and guide the ideation process. Scenarios evoke reflection about design issues and enable to evaluate and improve design ideas concretely in their context (Carroll, 1999). Moreover, designers can see a well-defined context in scenarios from different angles and discover additional requirements which have not been realized yet (ibid.). Thus, scenarios were chosen as a thinking and design tool.

As a medium, a textual description rather than storyborads and running systems on an actual platform was chosen to promote imagination for visualizing the situation and to save time (cf. Nielsen, 1995*b*). The scenarios of this project are inspired by the interviews and my own experiences.

As the service is divided into two major parts: information and memories of nurturing a baby, each scenario deals with a different topic, such as finding information, capturing and sharing a moment, and enhancing experiences by utilizing memories of a sibling as tailored information, a special feature of the service. In order to capture multicultural aspects, the scenarios also include diverse users. As families these days come in many forms, the situations described here follow the ones that arose from the interviews for the sake of keeping the scope realistically focused. There are four scenarios altogether:

1. *Having a Flu* (Section 5.1.1). An ad-hoc case where there is a need for urgent information.
2. *Standing up* (Section 5.1.2). A typical source of reminiscence, based on one of the developmental milestones, coupled with detailed information on a sibling, which makes the experience more intriguing for the family.
3. *Giving a Name* (Section 5.1.3). In this scenario the parents must choose a name for a baby, and the decision should be made in due time.
4. *The Party* (Section 5.1.4) deals with memorable moments and how the system is involved in arranging and sharing time.

The design implications and requirements arising from the scenarios are analyzed and discussed in the following sections.

5.1.1 Having a Flu

Lenni, a ten month old boy, is sick. He has had a cough and runny nose for a couple of days, but it is not serious. Today is a special day for both Aleksi and Kati, Lenni's father and mother. It is the first day Aleksi takes care of Lenni at home. Aleksi is on a paternal leave, and Kati goes back to work. Since Aleksi has often been with Lenni without Kati, he thinks he would not face any problem any time soon.

It seems Aleksi is too optimistic. Around noon, his son develops a mild fever of 37 degrees Celsius, but his temperature soon soars to 38.5 degrees. He decides to use a suppository, Panadol. After one of the vaccinations, Lenni's Neuvola nurse recommended to have it, so he bought it. However, after an hour, it seems the medicine does not affect the fever at all, but his son is still actively playing. He calls the number which they use for booking Neuvola meetings, but it is already after the calling hours. He is little bit upset and calls Kati.

Kati is busy at work, but she remembers that she once read how to react to fever on *Dearest Memories*. She reminds Aleksi to search for it. He is not aware of such information existing on the service at all, as he has been only checking the developmental information on it. He uses the search function to access the information and eventually finds out he could call the nearest health station until 16.00 or a 24h health service line. He talks to a nurse on the phone, and the nurse advises him to give another type of medicine to Lenni.

5.1.2 Standing up

Leo, a nine month old boy, stands by himself for the first time. Anna, Leo's mother, who is currently taking care of him at home, quickly takes a photo of him standing alone, with her mobile and uploads the file with a comment to *Dearest Memories*, where she saves Leo's first year reminiscences, like a shoebox filled with cherished items with their past, but in the form of a digital service. The service asks if she would like to share to other social network services. She chooses *Facebook* to announce the significant event to a bigger audience compared to *Dearest Memories*.

She calls Matti, Leo's father, to share the moment. They confirm Leo's motor skill developments so far and discuss if they are faster or slower than the average. For example, sitting up, rolling over, and crawling. They remember the time differently for some of Leo's achievements. Then they start wondering when Elias first stood up. Elias is Leo's brother, a four year old boy. Anna cannot tell when it happened with Elias. Matti assumes it was earlier than Leo, perhaps eight months old. Since Matti still needs to work, they decide to check the details together later at home.

In the evening, after putting both boys to sleep, Anna and Matti access the service, *Dearest Memories*, as part of their daily routine. They remember the moment of joyful surprise from Leo today. They elaborate their emotions toward the event on

the service. They scan through Leo's timeline and compare it with Elias'. It seems Leo's motor skills have developed at almost the same time. According to the timeline, they should see Leo's first steps two months later.

5.1.3 Giving a Name

Eunyoung and Mikko just decided their baby daughter's name, Lumi—snow in Finnish. She is only two weeks old. Since they try to find a name that Koreans could pronounce easily, yet nice for Finns, the Finnish name list on *Dearest Memories* is useful. They browse through the names in an alphabetical order, and the most popular girls' names in Finland for recent years. Eunyoung is particularly fond of monitoring the popularity of names. She avoids too favored names. As a Korean, having the same name with several people around her does not feel pleasant. The service also shows a name day for each name.

Eunyoung has not been aware of the concept of name days, but now she is ready for celebrating Lumi's name day, the 2nd of February. While Eunyoung dives into Finnish name culture, Mikko gets an idea of organizing a name giving ceremony without a baptism using *Dearest Memories* and figures out how to register their daughter's name, the registration period, and Finnish Names Act.

5.1.4 The Party

They set up the event and send an e-mail invitation to people through *Dearest Memories*. The ceremony is held when Lumi turns a month old. Unfortunately, Eunyoung's parents cannot make it, since they live in Korea. Due to the difference between the time zones, they cannot make a video call to the party. Even if they did, there would be no-one dedicated for shooting a video throughout the event. Thus, Eunyoung will share only the records from the party through *Dearest Memories* with her parents: photos, video clips and some comments from the participants. She includes her parents in the event on the service, so they have the permission to see the updates like all visitors.

During the ceremony, Eunyoung and Mikko manage to take a few photos with their mobiles. Their photos are uploaded immediately. Mikko's sister, Anne, takes a lot of

photos with her good quality camera because Mikko asked her in advance, based on the tips from *Dearest Memories*. Other guests also take photos and videos with their mobile phones. Before the party ends, Eunyoung and Mikko request sharing visitors' mediated memories and thoughts through the link in the event invitation.

A couple of days later, they thank the visitors on the event page of *Dearest Memories*. The service sends the message to the participants and suggests leaving a comment and uploading the files from that day. Only Eunyoung and Mikko get the notifications from the page whenever there are some updates, as they set it that way. Eunyoung's parents also get the link from the service, and they see the photos and videos and leave comments about the lovely name and the party.

5.2 Analysis of the Scenarios

Scenarios allow to explore the possible contexts of using a service. Analyzing scenarios enables to identify needs and establish requirements (Preece, Rogers and Sharp, 2002, 201–238; Cooper, Reimann and Cronin, 2007, 107–123). As these scenarios are based on research, namely the interviews, the analysis can also confirm the needs and requirements that have risen from the study.

5.2.1 Findings from "Having a Flu"

Notes on Scenario 5.1.1:

- Father as the primary caregiver; staying home
- Ad-hoc needs (temperature tracking)
- Health information (how to handle a high fever), not growth (timely) information; regular vs. ad-hoc basis
- One user (in this case, the mother) might know the service better than the other
- Visibility issues; taking a quick glance
- Search functionality needed
- Information from the outside, in this case, a nurse; the division between information sources; constraining service contents

As the service intends to cover the life with a baby extensively, information which is not connected to a specific time, like health information, needs to be promoted, and the overview of the service elements needs to be carefully considered. Search should be easily accessible and has to show where each data belongs. For example, fever as general information or a lived experience.

5.2.2 Findings from "Standing up"

Notes on Scenario 5.1.2:

- Developmental (timely) information
- Mother as the primary memory producer; staying home
- Capturing a moment and uploading it; photo and text
- The service as a digital version of a shoebox (cf. van Dijck, 2007, 1–76)
- Sharing to other social networking services
- Private social networking; choosing the audience
- Whom to share most into with; the other parent
- Call; another way of communication; the service may provide chat, call, and video call; least priority
- Preferring a different source of information, not the system-provided one; the system could offer similar functionality based on saved data
- Comparison to another sibling (intriguing and encouraging) and the average
- Timeline overview of development
- Underestimating the similarities with a sibling
- Erroneous personal memories; retaining details as they are initially saved (cf. Stevens et al., 2001)
- Conflict of what a user has to do, and wants to do; work vs. record check
- Suggestion of using the application as part of the daily routine; encouraging more memory production
- Review of the day; reminder alarm

How to utilize interesting data, memories of a sibling, is the key issue in this scenario. The data could be replaced or combined with average growth information, as well as

inspire to produce a higher amount of records, which is against the common tendency of having less records of the second and the third child. Furthermore, there should be a way to encourage—but not irritate—users to use the service as part of their daily life.

5.2.3 Findings from "Giving a Name"

Notes on Scenario 5.1.3:

- Foreign mother, language barrier; foreign father, or even a foreign couple
- Name; name list for different genders, popularity of names
- Customs and rules of giving a name; name day, Finnish Names Act (Ministry of Justice, 2014)
- Choosing a name in due time; Awareness of the regulations (ibid.)
- Information is valid only at a certain time; reminder would be useful
- Suggestions about creating an event which could enrich memories
- Practices of the ceremony; Organizing an event

Information about a certain regulation, in this case, the Finnish name legislation, should be delivered early enough to parents so that they are prepared. The information could be displayed constantly until the task, registering a baby's name, is completed. Parents should be able to reach the information multiple times.

5.2.4 Findings from "The Party"

Notes on Scenario 5.1.4:

- Setting up the stage for a memory; Invitation, organizing before the event
- Need to share the event; physical distance and time difference
- The ideal situation might not be possible due to the conditions; shoot video all the time
- Materials to be shared: photos, video clips, and comments from the participants

- Who can access the content: party participants (initial) and grandparents (additional) who cannot be presented because of the constraints
- Tip for collecting memories; ask someone to be in charge of photography in advance
- Parents' photos can be uploaded during the event automatically; the service can offer a way to do it without any extra input
- Ways to collect material produced by others
- Reminding the visitors to share, first verbally and later digitally; should not be nagging, but still effective
- Boundary between real and digital; what the system could do, what the parents should do to improve the experience
- Notification pollution; who wants it (parents, grandparents), who would think it is too much (other visitors)
- Level of privacy; the event content can have its own users

Each memory event may turn into a small-scale private social network service of its own. Parents decide the initial and additional users for the service. Collecting the records from others needs to be done soon, otherwise the data is more likely to be lost.

5.3 Requirements

A requirement is a statement about an intended product that specifies what it should do or how it should perform. Requirements should be specific, unambiguous and as clear as possible. Without well-defined requirements the next phase, design activities, would require a lot of iterations. For instance, each single design idea might cause additional issues to solve. The priority of design ideas and the design direction would change every now and then. Requirements can be categorized into three types: functional (what the system should do), data (constraints of the required data), and environmental ones (the expected circumstances of the system). (Preece, Rogers and Sharp, 2002, 204–208)

There are four groups of requirements for *Dearest Memories*: general, information, memories, and development tracking. General requirements include technical, social, as well as basic functional ones. Information and memories, the staple functions of

the service, have their own requirements, They should be easy to reach and have their own categories. I have also added development tracking as a separate group of requirements which came up in the interviews. Although they are small features, they might still be essential for the service.

5.3.1 General Requirements

- Offline mode and sync
- Support for different form factors: mobile, tablet, computer
- Mobile app as the main interface of the service
- Exporting and editing for a tangible baby book
- Content producer and consumer roles (parents vs. relatives and friends)
- Parents together are the administrators of the service
- Search function
- Quick access to the camera on a mobile platform
- Fast and easy access to frequently used functions (information and memories)
- Extended menu to browse the entire content
- Activity reminder: to-do list, editing memories, keeping certain information temporary, tracking and latest activity

The service is Internet-based in order to facilitate contributing and sharing of memory products together with parents, relatives, and friends, yet offline data input and syncing must be allowed. The service supports several platforms, but the mobile, as a device, is the easiest to reach for the main caregiver, most often a mother. In other words, the mobile app is the staple interface to the service. Although one of the parents would use the service more, it should still encourage both parents to be involved in capturing and being aware of the growth of the baby.

5.3.2 Information

- Reliable and verified information is needed (e.g. Neuvola)
- Nurturing information in a timely order
- Information, or the data of older siblings (e.g. how was the older sibling at the same age?) works as frames for capturing moments, memories (inspiration)

- Promotion of information that does not connect to a specific point in time
- Categorization for thematic information scanning
- Bookmarks

The Neuvola service has been around in Finland since 1944 (Viljamaa, 2003, 35). The information from the service is reliable and verified by experts and offered timely. It is also favored by Finnish parents. However, different paper-based formats discourage them from checking the information when it is needed. Digitizing the Neuvola information is a good starting point.

5.3.3 Memories

- Data types: photo, video, text
- Sharing within the service (inviting relatives and friends) and with other services (e.g. *Facebook*)
- Chronological order
- A way to view the content thematically
- Each content can have different users who are invited by the parents (private social network)
- Other people than the parents can contribute to the content (uploading photos taken by them)
- Notifications may be targeted at only the parents by default
- A way to encourage augmenting visual material with text (the more descriptive the more memorable; search possibility)

The Memories function is a private social network service whose content is solely dedicated to a baby. It could resemble an existing social network service, such as *Facebook*, but the emphasis should be on the content rather than the authors and whom to share with.

5.3.4 Development Tracking

- Visualization of the key milestone timeline (average developmental milestones as default, an older sibling's data as an option)

- Digitizing the *Lapsuusiän Terveyskortti* (Neuvola statistics booklet)

An overview of the development of the baby will work both as a reward and encouragement for the parents. Digitizing the *Lapsuusiän Terveyskortti* is a related approach, focused on the Neuvola-provided information. Additionally, parents can see growth charts anytime. As of now, the charts are only available during the Neuvola visits.

Chapter 6

Screen Designs

As there is no single perfect design solution, an iterative design process (design-evaluation cycle) tends to lead to improved results (Preece, Rogers and Sharp, 2002, 186–195). The service at hand features diverse kinds of interaction (production, temporary co-authoring and content consumption). When assessing the validity of a design proposal with the expected users, an interactive prototype would be an optimal solution. Unfortunately, within the time frame, it was not possible to carry out an ideal design process, yet the proposal had to be evaluated. Therefore, I chose heuristic evaluation as the method for confirming the feasibility of the initial design mockups. This chapter describes the proposed screen designs, the results of the evaluation, and how the findings should be used in the future.

6.1 Building the Mockups

Although the service will support different platforms, a mobile phone will be the primary device to be used due to the easy of accessibility for the main users. If the ideas work fluently on a mobile, which has the smallest screen size, the service can be applied across the platforms relatively easily. Therefore, the initial design mockups are mobile app screens of the most critical features.

A mobile app is considerably affected by the user interface (UI) framework of a mobile operating system (OS) in terms of the look and feel, resolution, and what

and how components are to be used. The initial mockups are based on the *Android L* UI design framework, *Material Design* (Google, n.d.) because of the dominance of the OS in the global smartphone market (IDC, 2014). Adopting an existing UI framework provides more time in order to focus on fulfilling the actual requirements, rather than spending time with trial and error in building an own framework for the service.

Based on the requirements defined in the previous chapter, not only the two staple features of the service, information and memories, but also a feature that deals with ad-hoc or temporary issues has to be easily available. In particular, the additional feature needs flexibility in order to adapt and evolve according to the use of the service. The demands change significantly when a baby grows during the first year—the aspect of change should not be underestimated.

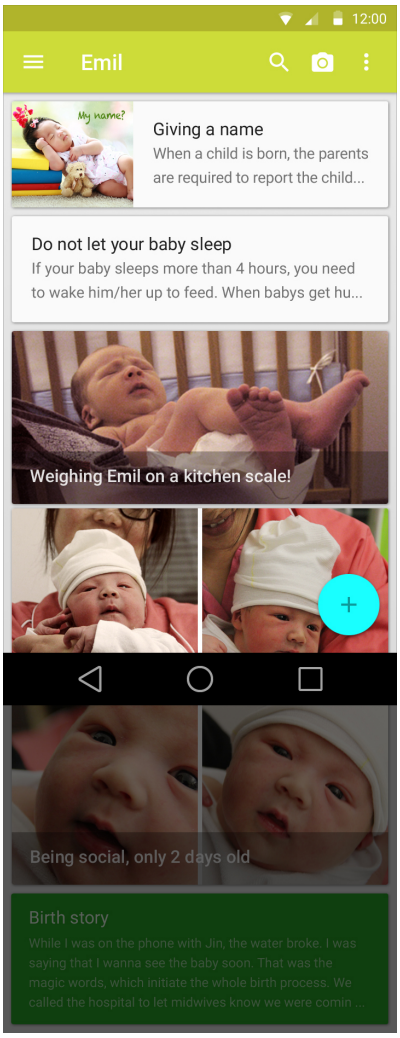

Figure 6.1: Launch screen

Initially, I considered a mashup of these three types of content as the launch screen (Figure 6.1). It is a kind of organic view that changes as time goes on. The first two categories would have their own independent views for more intensive exploration. On the other hand, the third feature would only appear on the launch screen, due to its temporary character. Each element of the third category has to be accessed through the menu if they are not placed in the launch screen. The difficulty of finding inactive ad-hoc functions, and the nature of the mashup, in other words, organic changes every time, might cause the user to feel lost.

The overall idea, displaying the latest and valid content from the three categories at any moment, might be problematic in a mobile app with a small screen. A user might end up scrolling quite a bit in order to scan through all the active content. For

instance, when a baby is very young, the launch screen could have some information to keep for a while, new available information, memory content in the middle of editing, finalized memory items, a couple of to-do lists, and several tracking tools such as sleep, diaper change and nursing. In that case, the list of the launch screen could exhaust a user who wants to have a quick glance at that moment.

The idea of having a launch screen should not be simply abandoned, however. The three main category views should utilize the positive features of a launch screen. The first two can have timely lists for checking the latest issues. The third one, which deals with temporary issues, can include the organic aspect of the mashup. Thus, a three main tabs proposal was selected to facilitate easy navigation between the categories: Information, Memories and Temporary. At this point the names are just working titles, particularly the third one, which may have to be considered once more when the design is settled.

So far, I have designed five screen mockups of the mobile app to be tested, and will continue the design work further later on. The first three screen mockups are the tabs: Information, Memories and Temporary. In addition, I decided to sketch two detailed views that I want to emphasize from a parent's perspective: the visualization of the key milestones' timeline and the digitization of *Lapsuusiän Terveyskortti*.

6.1.1 App Bar and Adding Memories

According to the guidelines, the app bar is used for branding, navigation, search, and actions (Google, n.d.). The service has adopted the app bar with some modifications (Figure 6.2). The left menu icon opens the main menu view—a nav drawer (Google, n.d.)—where users can access information and memories thematically, plus additional tools and general settings. The name and age of a baby distinguishes one from multiples or siblings. Tapping the name leads users to the *Lapsuusiän Terveyskortti* view (Figure 6.7). Searching the data and launching the camera application is always available throughout the service. The three dots icon on the right indicates the availability of additional view-specific functions, thus it might not be necessary to have it visible all the time.

Floating action buttons are a special type of promoted action (Google, n.d.). One floating action button is used for adding memories in the three main tab views (Figures 6.3, 6.4 and 6.5) because capturing moments is a key feature of the service.

Figure 6.2: App Bar

However, it might cause some misunderstandings related to its role in different contexts, and I need to rethink how to promote the function in a better way.

6.1.2 Information and the Tab View

Neuvola is the main source of information, as already mentioned in Chapter 5. The currently displayed information is valid at that very moment or the near future—until a month later. By pulling down the top of the list, the close past—a week before—becomes available. Parents do not need to look for information except in emergency cases. The information has been divided into categories, for example, the milestones, care and feeding, activity suggestions, health and parents; these may still require co-analysis with Neuvola. Categories enable parents to scan through the content thematically when they want to find a certain kind of information.

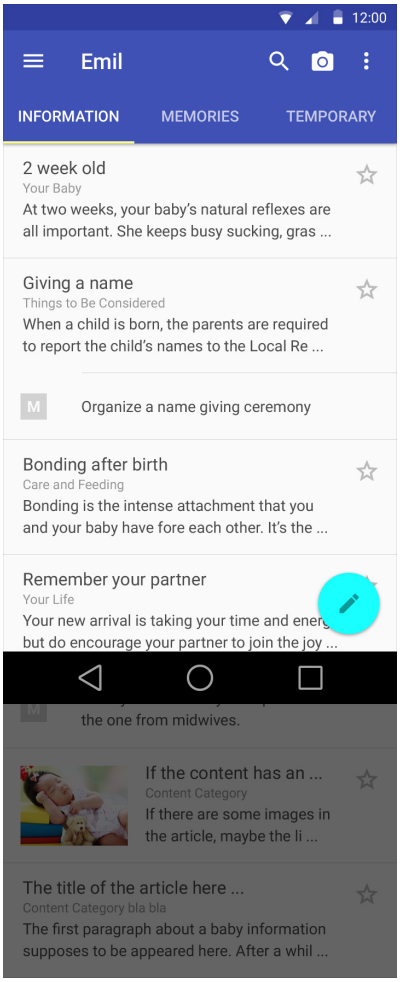

Figure 6.3: Information Screen

The tab view contains a list of information on nurturing a baby and also concerning the parents (Figure 6.3). The order is mainly based on time, yet information without a timely aspect is displayed once in a while for users to be aware of the general health issues concerning a baby. Each item consists of a title, a category or theme, and the beginning of the article as a preview. An article can contain a link to get more detailed information. Each item can be bookmarked, so

users can keep them for a while. As developmental milestones are expected to happen during a certain period, parents would probably like to keep them until they actually take place. The bookmarked items appear in the Temporary tab. If the item includes a good source for Memories, the service prompts the user to be active. The memory suggestion will take a user to a ready-made content frame, which belongs to the Memories tab. It has its own icon in order to clearly distinguish it from the rest.

If there are older siblings, their stored data can be utilized as tailored information in the tab view. For example, an item on the list may show the older siblings' developmental records at the same age. How exactly to manipulate the free-form sibling memory data has to be thought of later on during the development of the service. The Visualization of the Key Milestone Timeline (Section 6.1.5) describes one way of using the data.

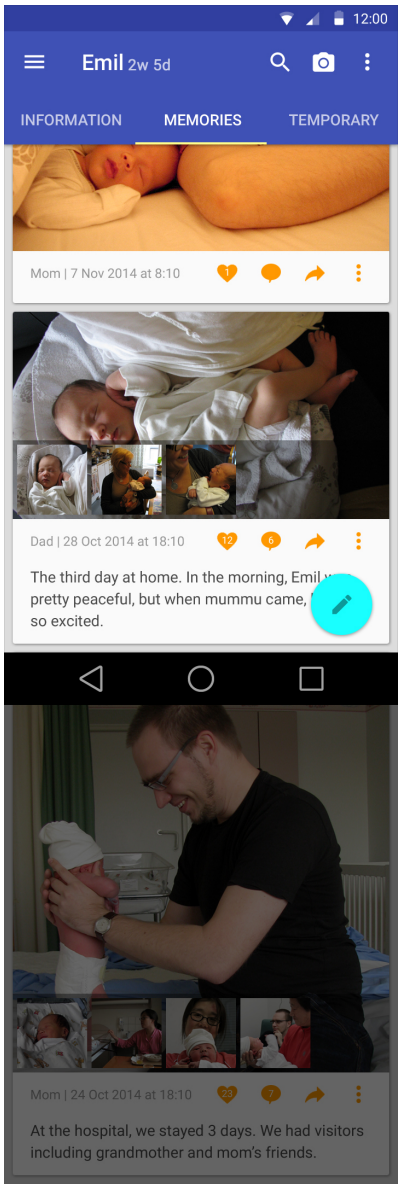

Figure 6.4: Memories Screen

6.1.3 Memories and the Tab View

This is the part of the service that can be shared with and shaped by more people than just the parents. I expect a photo with a comment to be the most popular content type, yet it is possible to also produce text-only records. Only a photo or video without comments or metadata is not favored by the service, due to the inefficiency of searching for and recalling the moment. If the content contains only visual data, it will appear automatically in the Temporary tab in order to encourage parents to add textual descriptions.

Thematic grouping of the content is possible and needed for setting the access rights.

Each theme is treated as its own private SNS
with possibly different members. The memories proposed by the system contain metadata that forms a specific category of memories. A collection of key milestones is an example of it. A thematic approach to the content works the same as the information content, but in a much more loose way. Notifications that appear in the Temporary tab are shown to only the parents by default, so that they do not unnecessarily bother other users.

With regards to the tabbed view (Figure 6.4), an item can feature photos, videos and text. The order of the content is the opposite of the Information tab view. The latest data is shown first and then the close past downward. The time element is important for sorting the content and realizing when each event happened. The visual elements of each item are more important here than the rest, as visual cues may trigger whole narratives at once (Stevens et al., 2001). If photos share the same theme or were uploaded at the same time, they are treated as a group that is displayed with one photo as a representative plus smaller thumbnails at the bottom.

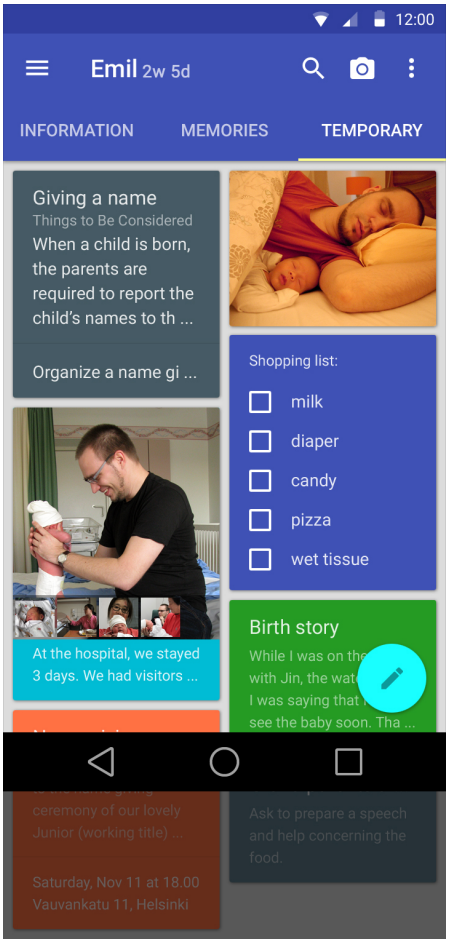

Figure 6.5: Temporary Screen

Not only the content can be shared with others inside the service, preferably web-based, but the parents can also share it in other SNSs such as *Facebook*. The tab view is quite similar to the *Facebook* timeline, but with a different emphasis on the elements of the content.

6.1.4 Temporary Tab

Temporary tab view (Figure 6.5) is a scaled-down version of the initial launch view idea (Figure 6.1). It is a place for keeping any pending information like the one mentioned in Section 6.1.2. Memory content that has not been finalized yet and notifications (see Section 6.1.3) are also displayed here. For instance, if an event is planned through the service, it can be accessed on this tab. The view inspires parents to complete the memory product. Parents can add to-do lists or notes as reminders. Baby-related calendar entries that will happen soon show up in the tab. When parents use tracking tools, they are shown here as shortcuts, but if the frequency of use gets lower, they will disappear. They can still be found through the main menu (menu – tracking tools – fever and medicine tracking). To sum it up, it is a tool for extending short-term memory (see Norman, 2002*a*, 54–80), and is only meant for parents or other caregivers.

6.1.5 Visualization of the Key Milestone Timeline

The timeline visualization (Figure 6.6) shows the overview of a baby's growth. Parents can reach the view with the thematic approach through the main menu. The view uses a cylinder with water as a metaphor for the baby's age. On the left side, the average developmental period of the key milestones is visualized. The milestones are initially half transparent, until the baby achieves it. There are eight of them altogether, all of which are significant sources of memory products:

1. Giving a Name (0–2 months)
2. Rolling over (4–6)
3. Solid food (4–6)
4. First teeth (4–7)
5. Sitting (6–8)
6. Crawling (6–10)
7. Standing alone (9–11)
8. First steps (11–14)

On the right side of the screen, a baby's photos at the key milestones are shown if parents enter the corresponding records in Memories. If there is no photo of the day,

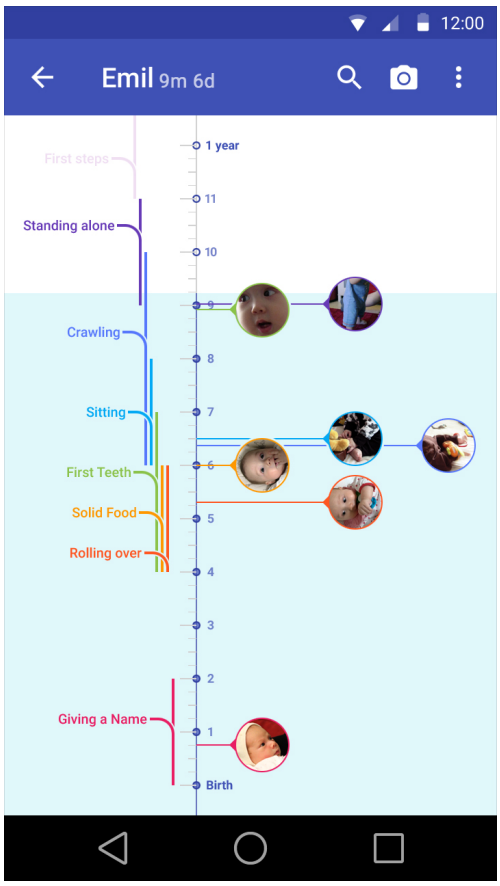

Figure 6.6: Visualization of the Key Milestone Timeline Screen

then the app will show the chronologically nearest photo. Parents can view the details by tapping the items, which is another way to access both information and memories.

The view itself is rewarding and inspiring for parents, promoting the taking care of a baby and capturing moments of the baby's growth. I also expect it to be used later on in family storytelling as a reference. This view offers the possibility of replacing the service-displayed information with older siblings' data or even accommodating both on the left side at the same time.

6.1.6 Lapsuusiän Terveyskortti

Lapsuusiän Terveyskortti has interesting and useful records of the baby growth written by medical staff during the Neuvola visits. The history of a baby's physical development is a potential source of family narratives, which helps to socialize with

other families that have children of the same age. The growth chart was added to the digital version of the booklet, as it was requested in the interviews. Indeed, the digitization extends the availability of the records.

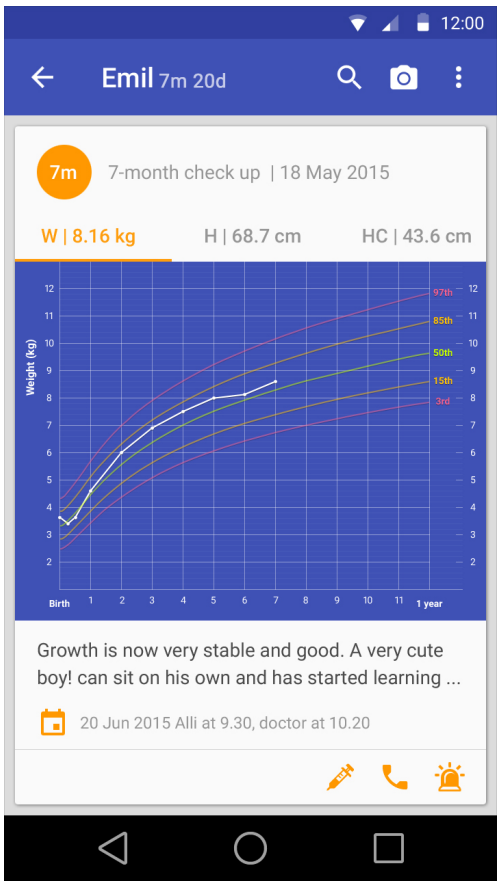

Figure 6.7: Lapsuusiän Terveyskortti

The view (Figure 6.7) shows the latest data of a baby's measurements—weight, height, and head circumference— and the measurement date. Tapping the date shows the history of the measurements and each title works as a tab of the growth charts. Parents can compare between their baby's growth and the average from the growth chart. The notes written by the medical staff on the same day are shown below the graph. Tapping the comments displays all of them together. As a reminder, the next appointment or when to book one is shown. Less frequently accessed, yet necessary information is available through the icons at the bottom: history of vaccinations, Neuvola contact details, and the information that is needed in an emergency case.

6.2 Usability Evaluation

There are lots of usability methods that can be applied throughout the design process. They improve the quality of design, but may also introduce extra work for designers and developers. In a real life case, the limitations of time and resources do not always allow you to take the ideal route. Nielsen's (1993) discount usability engineering as an alternative is, however, rather realistic. The approach is based on the use of four methods: user and task observation, scenarios, simplified thinking aloud, and heuristic evaluation (Nielsen, 1993, 17–20). I chose heuristic evaluation for ironing out the problems of the mockups, as it is fast, easy and suitable for use early on in the usability engineering life cycle (ibid., 155–163). The findings will provide direction for improving the design later on in the process.

Heuristic evaluation is a relatively informal usability inspection method, where specialists examine an interface in order to discover its usability issues. Unfortunately, individual evaluators may, in general, miss many of the usability problems. On the other hand, aggregating the evaluations from several specialists makes it possible to accomplish better results because different evaluators find different problems. Having five or at least three evaluators will offer reasonable performance without it getting too costly yet. (Nielsen and Molich, 1990; Nielsen, 1993, 155–163; Nielsen, 1994)

I recruited four usability specialists for the heuristic evaluation of this project. The task was to inspect five major screens of the mobile app (Figures 6.3, 6.4, 6.5, 6.6 and 6.7). *10 Usability Heuristics for User Interface Design* (Nielsen, 1995*a*) was used as the reference. The evaluators were requested to rank the problems using a four-point (note, cosmetic, medium and fatal) scale. The findings described below are grouped by individual screens plus the general findings.

6.2.1 General Findings

The icons on the app bar were mentioned repeatedly. The function of each icon was not clear. The icons of the main menu on the left and a view's own menu on the right conflicted with each other. The roles of the search and the camera were questioned: are they actually needed globally? In the same vein, questions on how to navigate among the screens were asked. The floating action button was considered too vague: it was not clear if the function is global or changes depending on the screen, and what

it is for—adding or editing. It was also considered an obstacle because it hides useful information. This seemed a fatal issue of the design because all of the evaluators pointed it out as a confusing element.

Furthermore, the case of more than one child, the first time use, and how the baby information is acquired to the service have to be considered. If the service has functional similarities to Facebook, a camera icon on the app bar and the floating action button, aligning the UI elements with it was suggested for easy approach and use.

6.2.2 Information

The most common issue (as pointed out by three evaluators) was the source of the information in terms of reliability. The list was understood as a collection of feeds. Some kind of indicator of read, unread, and new items on the list was requested. There was a metaphorical issue with the icons: the star icon was rather confusing because the starred information went to the Temporary view. In spite of that, the idea of the icon and the Temporary view was understood correctly. The same functionality should be available in the articles, too.

The M icon, standing for Memory, did not stand out and was not self-evident. There was also positive feedback; the overall layout was easy to grasp. Moreover, the specialists offered several proposals regarding the view: category-based approach to the information as an option, time stamps on the list, color coding for categories, and a first time use guideline.

6.2.3 Memories

Two evaluators assumed that the content came from other services—*Facebook* and a blog. There seemed to be a general impression that the look and feel resembled *Facebook* a lot. It was also difficult to distinguish the functional difference between this and the Temporary view. Questions along the lines of “Where do the comments and likes come from?” were asked. The arrow icon was not clear enough for one evaluator, but the rest understood it as share. The scope of the share function—Who do you share this with?—was vague. How to delete the content was not evident,

and one evaluator assumed that delete could be found in the additional menu—the three-dot icon. A fast scroll feature by date or category was proposed.

6.2.4 Temporary

The chosen title, Temporary, was the most fatal problem, since everyone pointed out that it did not reflect the content and was misleading. Two evaluators were not sure of the purpose of the screen because of the variety of the content. One of them suggested removing this view and replacing it with a combination of the other views—Visualization of the Key Milestone Timeline and *Lapsuusiän Terveyskortti*—for their better accessibility. The title of the new tab could be "My Baby". However, another evaluator understood the view as a user's working page that showed things to remember. The evaluator proposed this view as the starting page, and also stated that although the view contained temporary elements, the name should be more related to work-in-progress or currently relevant content.

The two-column layout was also controversial. Some of the text was too brief to let the reader grasp the idea because of the narrow columns. One evaluator called the two columns, "a patch work", which stood out due to its efficient use of space, but at the same time lost the layout consistency. The color coding was interpreted as content categories, but a small icon was mentioned as an alternative, improved solution. The shopping list caught their attention and sparked doubt concerning whether there would actually be one, or if it is needed at all. What the user can or cannot click was considered vague. How to modify or delete content was questioned again.

6.2.5 Visualization of the Key Milestone Timeline

This view seemed visually pleasant and engaging to all of the evaluators and offered a nice overview of a baby's development. On the other hand, it was not clear how to access the view. Since there was no title for the view, it took some time for one evaluator to realize the implication of the left and the right side content. Moreover, it seems that the view inspired evaluators to imagine various interactions in it. One asked if a user can access the memories straight from the view by tapping the photos on the right side and, in contrast, another one was wondering about the source of the content.

The possibility and the way of adding and editing elements in the view were asked about by two evaluators. Zooming the view seemed to be natural for two evaluators. One of them thought that this view has too much information on a small screen. She hoped that the view would grow together with the child, not just the fixed timeline of the first year. Thus, she was curious about scrolling, searching and the scalability of the data when it became bigger. One specialist mentioned that the view looked rather different from the main pages.

6.2.6 Lapsuusiän Terveyskortti

Navigating to this view was the most common concern, and one evaluator among the three who pointed out the issue assumed tapping the baby name on the app bar would lead a user to this view. This view was also considered visually delightful, but was less favored than the timeline view. The meaning of the three icons was not self-evident. One evaluator wondered if the icons are static icons for information or buttons that open new views. Another one thought the right icon represented an emergency situation. The evaluator claimed that if this is the only place to find the emergency information, it is not the right place because of not enough visibility. Furthermore, the abbreviations (W, H, HC) were not considered user-friendly. It took some time to figure out what they stood for. Using icons for them was proposed. Similarly, 7m was hard to understand and the number 7 seemed to repeat too much.

One specialist rated editing the data as a fatal problem. The evaluator was confused if the data came from Neuvola with no possibility of editing or manual uploading by parents. If it was the latter case, then editing and adding the data seemed missing to her. The specialist also asked about the rest of the data from the Neuvola visits—if there is a list of them. The case of more than one child was brought up again. It was already mentioned in the general findings but, additionally, the possibility of comparing the graphs between siblings was requested. Consistency-wise, an appointment as the newest piece of information was asked to be moved to the top. The use of percentiles on the chart was not comprehensible, yet it is the standard convention. The buttons on the bottom bar are usually physical buttons, but it is possible to have them on a screen, which caused confusion as the view had two back buttons.

6.3 Reflections

The evaluation highlighted missing features and found some problematic elements of the design from diverse angles. It also called attention to stressing the priorities of the requirements. Some of the problems that were pointed out were expected beforehand, but some findings provided fresh ideas. Evaluating just static screen designs, which imply lots of interaction, made it difficult to understand the workflows of the app. There were some misunderstandings concerning the interactions, yet some assumptions were actually among the planned future features. By the same token, the vagueness of navigating the content and views was mentioned several times.

There were some terminology and icon issues. As already expected, the title "Temporary" did not communicate the features of the tab to the evaluators. The title on the app bar needs to be reconsidered in order to be more user-friendly and self-explanatory. The abbreviation of the labels (W, H, HC) required some time to get the meaning. Some icon-only buttons should be accompanied by a label. In general, icons do not fully represent the functions behind them, but a review of the overall icons is best to be done only at the final stages of the design in order to have a consistent style and a well-defined representation of the different levels of functions. Reviewing the terminology should also be done in the same way as with the icons.

Some of the functions have to be redefined: global functions like search and opening the camera app on the app bar, plus adding, editing and deleting the content in general. Especially the floating action button was far too confusing for the purpose, even though it was aimed at adding content—mainly memories, but also notes—quickly, easily and globally. The button was one of the most problematic elements, so I may need to reconsider the whole idea.

There were also positive comments. The two views that show the overview of the development were considered delightful and appealing. Even if usability counts as probably the most important design issue, the role of aesthetics should not be underestimated, as a visually attractive user interface also enhances the experience (Norman, 2002*b*). One evaluator hoped to see the finalized mobile app one day. Another wanted to extend the service beyond the first year. A thematic approach, which has been considered, yet not designed, was mentioned often. It definitely has a priority to get implemented in the next steps of the process and will probably solve the navigation issue. The comparison was already considered, but only for the timeline

view. The idea, comparing the growth on the chart, will be another entertaining feature for parents who have more than one child. Perhaps one day it will be used for a generation comparison.

Chapter 7

Conclusion

This project stemmed from my personal experiences in having my first baby. The initiative for it primarily came from negative emotions: frustration, feeling lost and isolated, and wondering if I am doing fine or missing something. On the other hand, there were a lot more happy and positive moments; parenthood is one of the emotionally richest moments of one's life.

This journey, the project, started from a very simple thought, but step by step I have realized that the issues are not only mine, and that there is a lot to be improved. Surely, I have eventually discovered solutions to all the challenges, but they have not been fully satisfactory. The pervasive aspect of ICT has not been exhaustively utilized in this domain yet: we are still in the middle of the adapting process, and this thesis presents one possible direction of how things could evolve. Initially, I thought of a simple mobile app that could support mothers at the beginning, but throughout the journey the idea has grown much bigger together with my understanding of the domain.

One of the most interesting discoveries is the link between information and memories. The finding should be systematically utilized in digital culture, in order to take full advantage of technologies. With the same approach, comparisons between siblings or even generations could create another layer of social yet family-focused connections and activities with positive aspects, especially since the stories about the family are regarded as more important and meaningful to individuals than, for example, the history of their country or community. One day, we might be able to view the

complete timeline of the family members next to each other, and scan through their life stories together.

Recent news (The Telegrahp, 2014) on cloud storage security leaks have, again, brought up the risks of using otherwise convenient technologies. Without a doubt, the privacy issues have to be taken seriously, and there is a need for a solid technical solution. The digitization of personal data provides an opportunity to think about who actually owns it. As it is precious information for individuals, the content should not be exploited. When completed, this service should offer an option to export the data completely in the end and delete it from the service, if the parents so wish. At that point the risk of losing the data is also transferred to the parents.

Even though I have sought to narrow down the scope of the project, it has still expanded beyond the time allocated for the thesis, as mentioned above. First of all, the results of the heuristic analysis have to be utilized in the design process. The scope of the project should be extended even further, from pregnancy to beyond one year, and I need to study what age is optimal for eventually terminating the use of the service.

The information offering part has to be co-operatively revised with Neuvola. They have a long tradition of developing their services, and are the best source of information in Finland. There have already been some trials of adopting digital environments to their services (Honkonen, 2012; Sitra, 2014). In my opinion, this is the way to go for Neuvola. The digitization of the service will standardize the service across the country to a certain extent (Hakulinen-Viitanen, Pelkonen and Haapakorva, 2005). The service can possibly also be adapted for other countries—it would be especially fruitful to donate it to third world countries as a Finnish gift providing for the well-being of both parents and children.

As to the memories, tweaking an existing service (e.g. *Facebook* or *Google+*) would be the easiest way to implement the whole idea, if possible. Nowadays, implementing ideas is mostly not a matter of possibilities. It is rather your approach to the problems that decides whether a solution will be accepted by societies or not.

Although the service can be divided into two big modules, information and memories, I hope that both modules will remain in service for the best possible support for parenthood. Considering the constantly changing needs of the parents, information offering is most important at the beginning. By contrast, the value of memories grows gradually over time. Apart from the memories, old information should be replaced

with more actual content. In an optimal case, *Dearest Memories* can become a useful digital parenting helper that evolves over time.

I would like to continue developing the service as described above, or at least improve it to some extent, and eventually see the actual application on my mobile. That part of this journey I cannot complete on my own, and there will be a need for other experts ranging from childcare professionals to software developers.

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Appendix A

WebMD Baby Content

1. Home (personalized information for a specific age, content extracted from the main site)
    - Weekly Feature
    - Daily Tip
    - Featured Article
    - Video Q&A
2. Baby 101 (thematic & searchable information)
    - Baby & Toddler Care (various articles and videos under 16 themes including Baby Gear, Growth & Development, Skin Care, Oral Health, and Potty Training)
    - Illnesses & Emergencies (39 articles, which explain the possible symptoms, how to cope with them and instruct when to call a doctor)
    - Just for Moms (nine articles and one video, e.g. Postpartum Depression: What Is It, and What Causes It?)
    - Just for Dads (five articles, e.g. New Dads: What to Expect After Baby)
    - Parenting Tips (weekly-based daily tips for 12 months and monthly-based a set of daily tips for a week until 24 months)
    - Baby Week By Week (weekly information for 12 months and monthly information for 24 months. Each category has the short information and

acces to the details of the category's headline, a link to Parenting Tips, and a few links to related articles or videos.)

- Ask the Pediatrician (five videos, e.g. Top Mistakes New Parents Make)
- Milestones (timely order with seven categories, each category has a list of expected development information focused on various aspects, e.g. Movement, Social, Cognitive, and Language. More details of the information under the lists can be found.)
- Vaccines (13 articles and one videos, e.g. Hepatitis A and B)
- Baby Doctor Visits (11 articles about Checkups: What to Expect, mainly what the doctor would do and what questions the doctor would ask.)

3. Journal (organizing tool for the baby)

   - BabyBook (mainly for photos and videos, allowing the parents to capture and record the baby's key moments and milestones. The contents can be shared via email, *Twitter* and *Facebook*.)
     - My Arrival (17 pre-defined titles, for instance, Mommy's Pregnant Belly, My Arrival, My Hospital Bracelet, and My Homecomming)
     - My Firsts (17 pre-defined titles, for example, First Bath, First Tummy Time, First Tooth, and First Haricut)
     - Watch Me Grow (a photo can be added for each week)
     - Favorites (pre-defined 13 themes, for instance, Soothers, Foods, Books, and Videos)
     - Words (the baby's new words for each month)
     - Unforgettable (11 pre-defined titles, for example, Sleeping, Playing with Toys, and Messy Food Face)
     - Family & Friends (forces to add a custom title before adding any photos)
     - Holidays (four pre-defined titles, such as New Year's Day, Independence Day, Halloween, and Thanksgiving Day)
   - Feeding (tracking tool, useful at the early stages of development)
   - Notepad
   - Sleep (tracking tool, useful at the early stages of development)
   - Growth (tracking tool)
   - Diapers (tracking tool, useful at the early stages of development)

4. Settings

Appendix B

Outline of the Interview

Looking back at the first year of my motherhood, it was difficult to be aware of the expected baby growth at the right time. Turning over, crawling, teething, babbling, those can be memorable milestones of the baby growth. Having a small baby was a lot of work, and it was hard to be an active information seeker. Neuvola might have been a good source of information, but there was a language barrier for me. Even if looking for the information actively, heavy information load and reliability would have been an issue. Passive information consuming from trusty sources would have been rather appreciated. As a new mother, I was not sure what information to seek and I often felt lost. If there was a nice guideline at the right moment, I would have enjoyed the moments with my baby more comfortably.

Besides, I wanted to share the joyful moments with my relatives and friends who live here and there. Taking photos was not a big deal but sharing required some time and different methods. Facebook, e-mail, Skype, some help from my siblings for my parents and verbal descriptions on the phone were used as means.

These were about my baby, one person. Hence, I came up with a project about having own media for a baby. The target age ranges from birth to one year old, since the development is dramatic during the time and the parents' life has changed a lot.

The existing tools are mainly tracking tools. The other kind is information offering based on a timeline.

Experiences:

- What has been your main information resource on baby development?
- Have you used any baby-related tools? Apps? Books?
- What have you saved or would like to keep as your memories?
- How do you share happy moments with your baby with others?
- Who are the people you want to share the memories with?

Expectations:

- If there were a tool that offered information on baby growth and encouraged recording the memories, would you use it?
- What kind of information would you want to get?
- What kind of functions would you want to have in the tool in terms of capturing memories?

Appendix C

Ensimmäinen vuoteni (My First Year)

Translated content of the page shown in Figure 4.1.

You Grew and Developed

- Your first smile
- Your first tears
- You held your head up while lying on your stomach
- You rolled to your side
- You sat without support
- You started crawling
- You started crawling on your knees
- Your first word
- You stood up with support
- You walked without support
- Your first lower tooth
- Your first upper tooth
- Plays you liked
- Songs you liked

- Your dearest toy
- Your favorite food
- . . . or not
- Your height at 1 year of age
- Your weight at 1 year of age